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MEDITERRANEAN PILOT
VOL. III



1917

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**FROM THE
UNITED STATES GOVERNMENT**

H. O. No. 153

MEDITERRANEAN PILOT

VOLUME III

THE OUTHEAST COAST OF ITALY, THE SHORES
OF THE ADRIATIC AND IONIAN SEAS
TO CAPE MATAPAN

1917

PUBLISHED BY THE HYDROGRAPHIC OFFICE
UNDER THE AUTHORITY OF THE
SECRETARY OF THE NAVY



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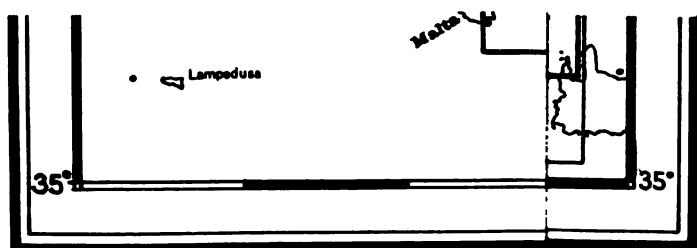
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P R E F A C E .

This publication comprises the south coast of Italy from Cape Spartivento eastward; the shore and islands of the Adriatic Sea to Cape Matapan; including the Ionian Islands, the gulfs of Patras and Corinth. This information contained herein has been compiled from all available sources, but principally from British Admiralty publications, *Mediterranean Pilots*, Volumes II and III, and is corrected up to and including H. O. Notice to Mariners No. 23, 1917.

The bearings and courses are true and are given in degrees, from 0° north to 360° (clockwise).

Bearings limiting sectors of lights are toward the light.

The directions of winds refer to the points from which they blow; of currents, the points toward which they set. These directions are true.

Variations, with the annual rate of change, may be obtained from H. O. Chart No. 2406, Variation of the compass.

Distances are expressed in nautical miles, the mile being approximately 2,000 yards.

Soundings are referred to low water ordinary springs.

Heights are referred to high water ordinary springs.

The latest information regarding lights, their characteristics, sectors, fog signals, and submarine bells should always be sought in the light lists.

Attention is invited to the coupons on the first page of this book, which entitle the purchaser to a summary of the Notices to Mariners affecting this publication. They will be ready for distribution as soon as practicable after the first of each year beginning January, 1918.

Mariners are requested to notify the United States Hydrographic Office, directly or through one of its branch offices, of any new information obtained, or of any errors or omissions discovered in this publication.

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Glossaries of Words Occurring in the Charts and Sailing Directions.

| Italian. | English. | Italian. | English. |
|---------------------------|---|--------------------|--|
| Acqua..... | Water. | Corpo di Guardia.. | Guardhouse. |
| Acquitrino..... | Swamp. | Corrente..... | Current. |
| Albero..... | Mast, tree. | Corto, a..... | Short. |
| Alga (pl. Alghe)..... | Seaweed. | Darsena..... | Wet dock or basin, dockyard. |
| Allerta..... | Lookout. | Dogana..... | Customhouse. |
| Altezza..... | Height. | Eclissi..... | Eclipse. |
| Alto, a..... | High, lofty. | Entrata..... | Entrance. |
| Alzata..... | Embankment. | Erto..... | Steep, straight, bold. |
| Ancoraggio..... | Anchorage. | Estate..... | Summer. |
| Approdo..... | Landing place. | Fanale..... | Lighthouse, light, lantern. |
| Arcipelago..... | Archipelago. | Fango..... | Mud. |
| Arena..... | Sand, gravel. | Faro..... | Lighthouse. |
| Argilla..... | Clay. | Ferro..... | Iron. |
| Azzuro..... | Blue. | Ferrovìa..... | Railway. |
| Bacino..... | Basin, dock. | Fiore del Mondo... | Compass card. |
| Baia..... | Bay. | Fissa..... | Fixed. |
| Balza..... | Rock, cliff, precipice. | Fiumara..... | River. |
| Banchina..... | Quay, wharf. | Fiume..... | River. |
| Banco, Banchi..... | Bank, banks. | Fiumicino..... | Rivulet. |
| Bandiera..... | Flag. | Folgori..... | Flashing. |
| Barca..... | Boat. | Fondo..... | Bottom. |
| Barra..... | Bar. | Fontana..... | Fountain, spring. |
| Bassofondo..... | Shoal, shallow. | Foresta..... | Forest, wood. |
| Batello..... | Boat. | Forte..... | Fort. |
| Bianco..... | White. | Fortino..... | Small fort. |
| Boa..... | Buoy. | Gavitello..... | Buoy. |
| Boa da ormeggio..... | Mooring buoy. | Ghiaia..... | Gravel. |
| Boa da tonneggio..... | Warping buoy. | Girante..... | Turning, revolving. |
| Boa luminosa..... | Light buoy. | Golfo..... | Gulf, bay. |
| Bocca, Bocche..... | Mouth or entrance to a river, bay, or strait. | Grande..... | Great. |
| Bosco..... | Wood, forest. | Gru..... | Crane. |
| Braccio..... | Fathom. | Gruppo..... | Group. |
| Burrasca..... | Squall. | Guado..... | Ford. |
| Bussola..... | Compass. | Imboccatura..... | Mouth of river. |
| Cala, Calanca..... | Creek or little bay in the Mediterranean. | Isola..... | Island. |
| Calata..... | Wharf. | Isolotto..... | Islet. |
| Caldaie..... | Boilers. | Istmo..... | Isthmus. |
| Campanile..... | Campanile, belfry, steeple. | Lago..... | Lake. |
| Canale..... | Canal, channel. | Luce..... | Light. |
| Capitaneria di Porto..... | Captain of the Ports' office. | Lume..... | Light. |
| Capo..... | Cape, headland. | Macchine..... | Engines. |
| Carbone..... | Coal. | Magazzino..... | Warehouse. |
| Caricatori..... | Shipping place. | Mancine..... | Crane. |
| Casa..... | House. | Mare..... | Sea. |
| Casino..... | Country house, club. | Marea..... | Tide. |
| Castel, Castello..... | Castle. | Mareografo..... | Tide gauge. |
| Chiesa..... | Church. | Marina..... | Beach, landing place for village or town, a little inland. |
| Cima..... | Summit. | Meda..... | Beacon. |
| Citta..... | City, town. | Meridionale..... | Southern. |
| Collina..... | Hill. | Molino..... | Mill. |
| Conchiglia..... | Shells. | Molo..... | Mole. |
| Corallo..... | Coral. | | |

Glossaries of Words Occurring in the Charts and Sailing Directions—Continued.

| Italian. | English. | Italian. | English. |
|--------------------------------|---------------------------|-------------------------|------------------------------|
| Montagna..... | Mountain. | Rondo..... | Round. |
| Monte..... | Mount, mountain, hill. | Rosa..... | Pink. |
| Muro..... | Wall. | Rosa della Bursola..... | Compass card. |
| Nave..... | Ship, vessel. | Rosso..... | Red. |
| Nebbia..... | Fog, mist, haze. | Rotondo..... | Round. |
| Nebbioso..... | Foggy, misty, hazy. | Rovina..... | Ruin. |
| Nero..... | Black. | Rupe..... | Rock, crag, cliff. |
| Neve..... | Snow. | Sabbia..... | Sand. |
| Nube..... | Cloud. | Salina..... | Salt water lagoon. |
| Nuovo..... | New. | Sanita..... | Health. |
| Nuvolo..... | Cloudy, misty. | Santo..... | Holy, sacred. |
| Occidentale..... | Western. | Sasso..... | Stone, pebble, rock. |
| Oliva..... | Olive. | Sbarcatoio..... | Landing place, quay. |
| Onda..... | Wave. | Scacchio..... | Chequers. |
| Orientale..... | Eastern. | Scafo..... | Hull. |
| Ormezzo..... | Mooring. | Scala..... | Landing steps. |
| Ospedale..... | Hospital. | Scalo d'Alagio..... | Patent slip. |
| Osservatorio..... | Observatory. | Scandaglio..... | Sounding lead. |
| Palo..... | Stake, post. | Scoglio..... | Rock, reef. |
| Palombaro..... | Diver. | Scogliera..... | Ridge of rocks. |
| Palude..... | Swamp, marsh. | Secca..... | Shoal, sandbank. |
| Passo..... | Pass, channel. | Segnale..... | Signal, mark. |
| Penisola..... | Peninsula. | Seno..... | Small bay, creek. |
| Pericolo..... | Danger. | Settentrionale..... | Northern. |
| Piano..... | Plain, flat. | Sfera..... | Sphere, ball. |
| Pianura..... | Plain. | Solfo..... | Sulphur. |
| Picco..... | Peak. | Spalla..... | Shoulder, back, sum- mit. |
| Piccolo, Picciolo..... | Small, little. | Spento..... | Extinguished. |
| Pietra..... | Stone. | Splendore..... | Flash. |
| Pila..... | Pile. | Sponda..... | Bank, border, edge. |
| Pilastro..... | Pillar, pile. | Stagno..... | Lake, pond. |
| Pilota..... | Pilot. | Strada..... | Road. |
| Pioggia..... | Rain. | Stretto..... | Strait. |
| Piramide..... | Pyramid. | Striscia..... | Stripe, band. |
| Piroscafo..... | Steamboat or vessel. | Sughero..... | Cork, float. |
| Poggio..... | Mound, little hill. | Tavola..... | Table, list. |
| Ponte..... | Bridge, deck. | Telegrafo..... | Telegraph. |
| Pontile..... | Pier. | Tempesta..... | Tempest, storm. |
| Porta..... | Entrance, gate. | Tempio..... | Temple. |
| Porto..... | Port, harbour. | Tempo..... | Time, weather. |
| Posta..... | Post, post office. | Terremoto..... | Earthquake. |
| Pozzo..... | Well. | Testa, Testata..... | Head. |
| Presagio di tempe- sta..... | Storm warnings. | Tettoia..... | Shed. |
| Pressi..... | Neighborhood. | Tondo..... | Round. |
| Primavera..... | Spring. | Tonnara..... | Tunny fishery. |
| Promontorio..... | Promontory. | Tonneggio..... | Warping. |
| Punta..... | Point. | Torre..... | Tower. |
| Quarantena..... | Quarantine. | Torrente..... | Stream, torrent. |
| Rada..... | Road. | Ufficio, Uffizio..... | Office. |
| Rafo (local dialect)..... | Shoal, sandbank. | Valle..... | Valley. |
| Reti-Tonnare..... | Tunny nets. | Vecchio..... | Old, ancient. |
| Rilevamento..... | Bearing. | Vento..... | Wind. |
| Rimorchiatore..... | Tug. | Vetoso..... | Windy, stormy. |
| Riva..... | Coast, bank. | Verde..... | Green. |
| Rocca..... | Rock. | Vero..... | True. |
| Roccia..... | Rock, precipice. | Vetta..... | Summit. |
| Roccioso..... | Rocky. | Via..... | Road, street. |
| Romito..... | Hermit. | Villa..... | Villa. |
| | | Villaggio..... | Village. |
| | | Vulcano..... | Volcano. |

Glossaries of Words Occurring in the Charts and Sailing Directions—Continued.

| Greek. | English. | Greek. | English. |
|---|----------------------|-----------------------------|--------------------------|
| AgiOS, -a, -on, hagiOS, ayia, ayios. | Holy, sacred, saint. | Lips. | Southwest. |
| Akropolis. | Citadel, fortress. | Lithos. | Stone. |
| Akroterion. | Cape. | Megale, megalo, me- gas. | Great. |
| Anemo. | Wind. | Melaine, melan, me- las. | Black. |
| Apeliotes. | East. | Meses. | Northeast. |
| Aspros, -a, -on. | White. | Metron. | Measure. |
| Aster, astron. | Star. | Mikros, -a, -on. | Little. |
| Boreas, borras. | North. | Mulos. | Mill. |
| Bounon. | Mountain, hill. | Naos. | Church, temple. |
| Brachos. | Cliff. | Naulochos. | Harbor. |
| Broma. | Food. | Naus. | Ship. |
| Chersonesus. | Peninsula. | Neos, -a, -on. | New. |
| Chloros, -a, -on. | Green. | Nesos, nisia, nisia. | Islet, island, islands. |
| Chorion. | Village. | Notos. | South. |
| Chronos. | Time. | Oikos. | House. |
| Croma. | Color. | Ormos. | Anchorage, bay, port. |
| Dendron. | Tree. | Oros. | Mountain, hill. |
| Diorus. | Canal. | Palaios, -a, -on. | Old. |
| Drumos. | Wood. | Petra. | Rock. |
| Ekklesia. | Church. | Petros. | Stone, rock. |
| Eruthros, -a, -on. | Red. | Pharos. | Lighthouse. |
| Euros. | Southeast. | Philos. | Friend. |
| Glotta, glossa. | Tongue. | Phos, photos. | Light. |
| Gonia. | Angle. | Pneuma. | Wind. |
| Grapho. | I write. | Polis. | City, town. |
| Helios. | Sun. | Potamos. | River. |
| Hudor. | Water. | Prasinos, -e, -on. | Green. |
| Isthmos. | Isthmus. | Prioreus, pilotes. | Pilot. |
| Kastelli, kastro, kas- tron. | Castle, fortress. | Purgos, pyrgos. | Tower. |
| Kato. | Lower. | Semanterion. | Buoy, mark. |
| Khora. | Small town. | Skiron. | Northwest. |
| Kolpos. | Gulf. | Skopelos. | Rock. |
| Kome. | Village. | Skopes. | I see. |
| Kuklos. | Circle. | Taphos. | Tomb. |
| Limen. | Harbor, port. | Zephuros, zephyros. | West. |
| Limne. | Lake. | | |

Points of the compass in English, French, and Italian.

| English. | French. | Italian. | English. | French. | Italian. |
|-----------|-----------|----------------------------|-----------|-----------|-------------------------|
| North. | Nord. | Tramontana. | S. by W. | S. q. SO. | O. q. L. or M. q. L. |
| N. by E. | N. q. NE. | T. q. G. | SSW. | SSO. | O. L. or M. T. |
| NNE. | NNE. | G. T. | SW. by S. | SO. q. S. | L. q. O. or L. q. M. |
| NE. by N. | NE. q. N. | G. q. T. | SW. | SO. | Libeccio. |
| NE. | NE. | Greco. | SW. by W. | SO. q. O. | L. q. P. |
| NE. by E. | NE. q. E. | G. q. L. | WSW. | OSO. | P. L. |
| ENE. | ENE. | G. L. | W. by S. | O. q. SO. | P. q. L. |
| E. by N. | E. q. NE. | L. q. G. | West. | Ouest. | Ponente. |
| East. | Est. | Levante. | W. by N. | O. q. NO. | P. q. M. |
| E. by S. | E. q. SE. | L. q. S. | WNW. | ONO. | P. M. |
| ESE. | ESE. | S. L. | NW. by W. | NO. q. O. | M. q. P. |
| SE. by E. | SE. q. E. | S. q. L. | NW. | NO. | Maestro. |
| SE. | SE. | Sciocco. | NW. by N. | NO. q. N. | M. q. T. |
| SE. by S. | SE. q. S. | S. q. O. or S. q. M. | NNW. | NNO. | M. T. |
| SSE. | SSE. | O. S. or M. S. | N. by W. | N. q. NO. | T. q. M. |
| S. by E. | S. q. SE. | O. q. S. or M. q. S. | | | |
| South. | Sud. | Ostro or Mezzo- giorno. | | | |

NOTE.—On the French compass card q. stands for quart, or $\frac{1}{4}$, and on the Italian for quarto, or $\frac{1}{4}$; thus the Italian T. q. G. signifies Tramontana quarto Greco, or North a quarter north-eastward of the sector between North and NE., which is expressed on the English compass card by N. by E.

INFORMATION RELATING TO NAVIGATIONAL AIDS AND GENERAL NAVIGATION.

THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

The following publications are issued by the United States Hydrographic Office as guides to navigation: Charts, Chart Catalogues, Sailing Directions, Light Lists, Notices to Mariners, Pilot Charts, and Hydrographic Bulletins. Of these, the Notices to Mariners and the Hydrographic Bulletins are free to mariners and others interested in shipping. The Pilot Charts are free to contributors of professional information, but are sold to the general public at 10 cents a copy. The other publications of the office are sold under the law at cost price.

The Charts, the Sailing Directions, and the Light Lists are all affected by continual changes and alterations, concerning which information from all parts of the world is published weekly in the Notices to Mariners.

The charts are always corrected for all available information up to the date of issue stamped upon them; and the Light Lists should be noted for the recent alterations and additions. The Sailing Directions, however, can not, from their nature, be so fully corrected, and in all cases where they differ from the charts, the charts must be taken as the guide.

Charts.—When issued from the Hydrographic Office, the charts have received all necessary corrections to date.

All small but important corrections that can be made by hand are given in the Notices to Mariners, and should at once be placed on the charts to which they refer.

Extensive corrections that can not be conveniently thus made are put upon the plates, and new copies are put on sale. Masters of vessels are urged to replace the old charts, which should be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which extensive corrections are made are noted on the chart on the right of the middle of the lower edge; those of the smaller corrections at the left lower corners.

The edition, and corresponding date, of the chart will be found in the right lower corner, outside the outer neat line.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (found in the lower right and upper left corners), in order that the edition of the chart referred to may be known.

The Light Lists are corrected before issue, and all changes are published in the weekly Notices to Mariners.

The navigating officer should make notations in the tabular form in the Light Lists and paste in at the appropriate places slips from the Notices to Mariners.

The Light Lists should always be consulted as to the details of a light, as the description in the sailing directions is not complete, and may be obsolete, in consequence of changes since publication.

The Sailing Directions or Pilots are kept corrected by addenda; and subsequent to date of last addenda, they should be kept corrected by means of the Notices to Mariners. Sailing Directions issued to naval vessels carry with them an envelope containing slips of corrections up to date of issue.

Addenda are published from time to time, and contain a summary of all the information received up to date since the publication of the volume to which they refer, canceling all previous Notices to Mariners.

To enable the books to be more conveniently corrected, addenda and Notices to Mariners are printed on one side only, and two copies of the latter are issued to each naval vessel, one to be cut and the slips pasted in at the appropriate places, the other to be retained intact for reference.

To paste in the slips, as the Notices to Mariners are received, is one of the duties of the navigating officer, demanding faithful attention.

It must, however, be understood that Sailing Directions will rarely be correct in all details, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide, for which purpose, for ordinary navigation, it is sufficient.

The Tide Tables, which are published annually by the United States Coast and Geodetic Survey, give the predicted times and heights of the high and the low waters for every day in the year at 70 of the principal ports of the world, and, through the medium of these by means of tidal differences and ratios, at a very large number of subordinate ports. The tables for the Atlantic and the Pacific coast ports of the United States are also published separately.

It should be remembered that these tables aim to give the times of high and low water, and not the times of turning of the current or of slack water, which may be quite different.

Notices to Mariners, containing newly acquired information pertaining to various parts of the world, are published weekly and

mailed to all United States ships in commission, Branch Hydrographic offices and agencies, and United States consulates. Copies are furnished free by the main office or by any of the branch offices on application.

With each Notice to naval vessels is sent also a separate sheet, giving the items relating to lights contained in the latest Notice, intended especially for use in correcting the Light Lists.

Pilot Charts of the North Atlantic, Central American Waters, and North Pacific and Indian Oceans are published each month, and of the South Atlantic and South Pacific Oceans each quarter. These charts give the average conditions of wind and weather, barometer, percentage of fog and gales, routes for steam and sailing vessels for the period of issue, ice, and derelicts for the preceding period, ocean currents and magnetic variation for the current year, storm tracks for preceding years, and much other useful information. They are furnished free only in exchange for marine data or observations.

Hydrographic Bulletins, published weekly, are supplemental to the Pilot Charts, and contain the latest reports of obstructions and dangers along the coast and principal ocean routes, ice, derelicts, and wreckage, reports of the use of oil to calm the sea, and other information for mariners. They are to be had free upon application.

THE USE OF CHARTS.

Accuracy of chart.—The value of a chart must manifestly depend upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become.

To judge of a survey, its source and date, which are generally given in the title, are a good guide. Besides the changes that may have taken place since the date of the survey, in waters where sand or mud prevails, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail; until a chart founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbors and their approaches, no surveys yet made have been so thorough as to make it certain that all dangers have been found. The number of the soundings is another method of estimating the completeness of the survey, remembering, however, that the chart is not expected to show all the soundings that were obtained. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Large or irregular blank spaces among soundings mean that no soundings were obtained in these spots. When the surrounding soundings are deep it may fairly be assumed that in the blanks the water is also deep; but when they are shallow, or it can be

seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch or pinnacle rock.

A wide berth should therefore be given to every rocky shore or patch, and instead of considering a coast to be clear, the contrary should be assumed.

Fathom curves a caution.—Except in charts of harbors that have been surveyed in detail, the 5-fathom curve on most charts may be considered as a danger line or caution against unnecessarily approaching the shore or bank within that line, on account of the possible existence of undiscovered inequalities of the bottom, which only an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for so detailed a survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The 10-fathom curve on rocky shores is another warning, especially for ships of heavy draft.

A useful danger curve will be obtained by tracing out with a colored pencil, or ink, the line of depth next greater than the draft of the ship using the chart. For vessels drawing less than 18 feet the edge of the sanding serves as a well-marked danger line.

Charts on which no fathom curves are marked must especially be regarded with caution, as indicating that soundings were too scanty and the bottom too uneven to enable the curves to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed around, as it is doubtful how closely the spot may have been examined and whether the least depth has been found.

The chart on largest scale should always be used on account of its greater detail and the greater accuracy with which positions may be plotted on it.

Caution in using small-scale charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on one of small scale the same amount of displacement means a large fraction of a mile.

Distortion of printed charts.—The paper on which charts are printed from engraved plates has to be damped. On drying distortion takes place from the inequalities of the paper, which greatly

varies with different papers and the amount of the damping; but it does not affect navigation. The larger the chart the greater the amount of this distortion. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted on the chart, especially if the lines to objects be long.

Mercator chart.—Observed bearings are not identical with those measured on the Mercator chart (excepting only the bearings north and south, and east and west on the Equator) because the line of sight, except as affected by refraction, is a straight line and lies in the plane of the great circle, while the straight line on the chart (except the meridian line) represents, not the arc of a great circle, but the loxodromic curve, or rhumb line, which on the globe is a spiral approaching but never in theory reaching the pole, or, if the direction be east and west, a circle of latitude.

The difference is not appreciable with near objects, and in ordinary navigation may be neglected. But in high latitudes, when the objects are very distant and especially when lying near east or west, the bearings must be corrected for the convergence of the meridians in order to be accurately placed on the Mercator chart, which represents the meridians as parallel.

On the polyconic chart, since a straight line represents (within the limits of 15 or 20 degrees of longitude) the arc of a great circle or the shortest distance between two points, bearings of the chart are identical with observed bearings.

The Mercator projection is unsuited to surveying, for which purpose the polyconic projection is used by the Hydrographic Office and the Coast and Geodetic Survey.

Notes on charts should always be read with care, as they may give important information that can not be graphically represented.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact positions. They should therefore be regarded as warnings, and not as infallible navigational marks, especially when in exposed places and in the winter time, and a ship's position should always, when possible, be checked by bearings or angles of fixed objects on shore.

Gas buoys.—The lights shown by gas buoys can not be implicitly relied on; the light may be altogether extinguished, or, if periodic, the apparatus may get out of order.

Whistle and bell buoys are sounded only by the action of the sea; therefore, in calm weather, they are less effective or may not sound.

Lights.—All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of 15 feet for the observer's eye. The effect of a greater or less height

of eye can be ascertained by means of the table of distances of visibility due to height, published in the Light Lists.

The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Refraction, too, may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light, the fact may be forgotten that aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be obtained from the standard compass when you lay down from aloft.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the ship is on the circle of visibility corresponding with the usual height of the eye, or unexpectedly nearer the light.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by its candlepower or order, as stated in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range corresponding to its height. Thus, a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the influence of the wind large areas of silence have been found in different directions and at different distances from the origin of sound, even in clear weather; therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly toward the land, and may not be observed by the lighthouse keepers until upon them; a ship may have been for many hours in it, and approaching the land in confidence, depending on the signal, which is not sounded. When sound travels against the wind, it may be thrown upward; a man aloft might then hear it though inaudible on deck.

The submarine bell system of fog signals is much more reliable than systems transmitting sound through the air, as sound traveling in water is not subject to the same disturbing influences; the fallibility of the lighthouse keeper is, however, about the same in all systems, so that caution should be observed even by vessels equipped with submarine bell receiving apparatus.

Submarine bells have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus may determine the approximate bearing of the signal. These signals may be heard also on vessels not equipped with receiving apparatus by observers below the water line, but the bearing of the signal can not then be readily determined.

Vessels equipped with radio apparatus and submarine bell receivers may fix their distance from a light vessel having radio and submarine bell, utilizing the difference in velocity of sound waves of the radio and the bell. Sound travels 4,794 feet per second at 66° F. in water, and the travel of radio sound waves for practicable distances may be taken as instantaneous.

All vessels should observe the utmost caution in closing the land in fogs. The lead is the safest guide and should be faithfully used.

Tides.—A knowledge of the times of high and low water and of the amount of vertical rise and fall of the tide is of great importance in the case of vessels entering or leaving port, especially when the low water is less than or near their draft. Such knowledge is also useful at times to vessels running close along a coast, in enabling them to anticipate the effect of the tidal currents in setting them on or offshore. This is especially important in fog or thick weather.

The predicted times and heights of the high and low waters, or differences by which they may be readily obtained, are given in the Tide Tables for all the important ports of the world. The height at any intermediate time may be obtained by means of Tables 3 for most of the principal tidal stations of the United States, given in Table 1, and for the subordinate stations of Table 2 by using them as directed in the Tide Tables. The intermediate height may also be obtained by plotting the predicted times and heights of high and low water and connecting the points by a curve. Such knowledge is often useful in crossing a bar or shallow flats.

Planes of reference.¹—The plane of reference for soundings on Hydrographic Office charts made from United States Government surveys and on Coast and Geodetic Survey charts of the Atlantic coast of the United States is mean low water; on the Pacific coast of the United States as far as the Strait of Juan Fuca, it is the mean of the lower low waters; and from Puget Sound to Alaska, the plane employed on Hydrographic Office charts is low water ordinary springs.

On most of the British Admiralty charts the plane of reference is the low water of ordinary springs; on French charts, the low water of equinoctial springs.

¹ The distinction between "rise" and "range" of the tide should be understood. The former expression refers to the height attained above the datum plane for soundings, differing with the different planes of reference; the latter, to the difference of level between successive high and low waters.

In the case of many charts compiled from old or various sources the plane of reference may be in doubt. In such cases, or whenever not stated on the chart, the assumption that the reference plane is low water ordinary springs gives a larger margin of safety than mean low water.

Whichever plane of reference may be used for a chart it must be remembered that there are times when the tide falls below it. Low water is lower than mean low water about half the time, and when a new or full moon occurs at perigee the low water is lower than the average low water of springs. At the equinoxes the spring range is also increased on the coasts of Europe, but in some other parts of the world, and especially in the Tropics, such periodic low tides may coincide more frequently with the solstices.

Wind or a high barometer may at times cause the water to fall below even a very low plane of reference.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can not be depended upon and additional caution is necessary.

Mean sea level.—The important fact should be remembered that the depths at half tide are practically the same for all tides, whether neaps or springs. Half tide therefore corresponds with mean sea level. This makes a very exact plane of reference, easily found, to which it would be well to refer all high and low waters.

The Tide Tables give in Table 1, for all the ports, the plane of reference to which tidal heights are referred and its distance below mean sea level. See also explanation of Table 2.

If called on to take special soundings for the chart at a place where there is no tidal bench mark, mean sea level should be found and the plane for reductions established at the proper distance below it, as ascertained by the Tide Tables, or by observations, or in some cases, if the time be short, by estimation, the data used being made a part of the record.

Tidal streams.—In navigating coasts where the tidal range is considerable, especial caution is necessary. It should be remembered that there are indrafts to all bays and bights, although the general run of the stream may be parallel with the shore.

The turn of the tidal stream offshore is seldom coincident with the times of high and low water on the shore. In some channels the tidal stream may overrun the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The effect of the tidal wave in causing currents may be illustrated by two simple cases.

(1) Where there is a small tidal basin connected with the sea by a large opening.

(2) Where there is a large tidal basin connected with the sea by a small opening.

In the first case the velocity of the current in the opening will have its maximum value when the height of the tide within is changing most rapidly, i. e., at a time about midway between high and low water. The water in the basin keeps at approximately the same level as the water outside. The flood stream corresponds with the rising and the ebb with the falling of the tide.

In the second case the velocity of the current in the opening will have its maximum value when it is high water or low water without, for then there is the greatest head of water for producing motion. The flood stream begins about three hours after low water, and the ebb stream about three hours after high water, slack water thus occurring about midway between the tides.

Along most shores not much affected by bays, tidal rivers, etc., the current usually turns soon after high water and low water.

The swiftest current in straight portions of tidal rivers is usually in the middle of the stream, but in curved portions the most rapid current is toward the outer edge of the curve, and here the water will be deepest. The pilot rule for best water is to follow the ebb tide reaches.

Counter currents and eddies may occur near the shores of straits, especially in bights and near points. A knowledge of them is useful in order that they may be taken advantage of or avoided.

A swift current often occurs in a narrow passage connecting two large bodies of water, owing to their considerable difference of level at the same instant. The several passages between Vineyard Sound and Buzzards Bay are cases in point. In the Woods Hole passage the maximum strength of the tidal streams is at about high and low water.

Tide rips are made by a rapid current setting over an irregular bottom, as at the edges of banks where the change of depth is considerable.

Current arrows on charts show only the most usual or the mean direction of a tidal stream or current; it must not be assumed that the direction of a stream will not vary from that indicated by the arrow. The rate, also, of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

FIXING POSITION.

Sextant method.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor, sextant angles between three well-defined objects on

shore which are shown on the chart; this method, based on the "three-point problem" of geometry, should be in general use.

For its successful employment it is necessary: First, that the objects be well chosen; and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice. Two observers are better for this method.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand distant objects should be used for direction, because less affected by a small error or change of position.

The **three-arm protractor** or station pointer consists of a graduated brass circle with one fixed and two movable radial arms, the three beveled edges of the arms, if produced, intersecting at the exact center of the instrument. The edge of the fixed arm marks the zero of the graduation which enables the movable arms to be set at any angles with the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The **transparent xylonite protractor** is an excellent substitute for the brass instrument and in some cases preferable to it, as when, for instance, the objects angled on are so near the observer that they are more or less hidden by the circle of the instrument. The xylonite protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The **value of a determination** depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through three objects (in which case the sum of the observed angles equals the supplement of the angle at the middle object made by lines from the other two) it will be indeterminate, as it will plot all around the circle. Such an observation is called a "revolver." An approach to this condition must be avoided. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for

navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range of two objects give in general an excellent fix, easily obtained and plotted.

Advantages of sextant method.—In many narrow waters where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or of fresh soundings or new buildings as additions to the chart, the sextant should invariably be used. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. If a round of angles can be taken the observer's accuracy is also checked. In the case of ordinary soundings a third angle need be taken only occasionally; first, to check the general accuracy of the chart, as above stated; second, to make certain that the more important soundings, as at the end of a line, are correctly placed.

If communication can be had with the shore, positions may be fixed with great accuracy by occupying with theodolite or sextant two known points of the chart. The third angle of the triangle, that between the two points at the position sought, should be measured as a check.

The compass.—It is not intended that the use of the compass to fix the ship should be given up; in ordinary piloting the compass, with its companion, the polarus, may be usefully employed for this purpose, although less accurate than the sextant.

If the accuracy of the chart is doubtful, the compass should be used in preference to the sextant.

In fixing by the compass, it should always be remembered that a position by two bearings only, like that by two angles only, is liable to error. An error may be made in taking a bearing, or in applying to it the deviation, or in laying it on the chart. A third or check bearing should, therefore, be taken of some other object, especially when near the shore or dangers. A common intersection for the three lines assures accuracy.

When the three lines do not intersect in a point, the following rule holds: If the line drawn to the middle object falls to the right of the point of intersection of the lines to the two outside objects, the position of the observer was to the right of the line to the middle object; and if it falls to the left of the intersection his position was to the left of the line. Thus it will be seen that the assumption, that the position is at the center of the triangle formed by the intersecting lines, is incorrect.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

When the first bearing is $26\frac{1}{2}^{\circ}$ from ahead, and the second 45° , the run between bearings will equal the distance at which the object will be passed abeam.

A table of multipliers of the distance run in the interval between any two bearings of an object, the product being its distance at the time of the second bearing, is given in the Light Lists and in Bowditch.

Danger angle.—The utility of the danger angle in passing out-lying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, caution is necessary, as should the chart be inaccurate, i. e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

The vertical danger angle may be conveniently used when passing elevated points of known heights, such as lighthouses, cliffs, etc. The computation of the distance corresponding to the height of the object and its angular elevation requires for small distances merely the solution of a plain right triangle; the natural cotangent of the angle multiplied by the height in feet gives the distance in

feet. The convenient use of this method, however, requires tables such as those published by Capt. Lecky in his little book entitled "The Danger Angle and Offshore Distance Tables." This book very usefully extends the vertical angle method to finding a ship's position at sea by observing the angular altitude of a peak of known height and its bearing. The tables give heights up to 18,000 feet and distances up to 110 miles.

When the angles are not too large they should be observed "on and off the limb" and the index error of the sextant thus eliminated, in preference to correcting for it the single altitude. It must be remembered that in high latitudes the bearing of a distant object needs correction for the convergence of the meridians before being laid down on a Mercator chart. The correction may be found by the following formula, using the approximate position: The sine of the correction equals the product of the sine of half the difference of longitude by the sine of the middle latitude. It is applied on the equatorial side of the observed bearing and its effect is always to increase the latitude of the observer.

Soundings taken at random are of little value in fixing or checking position and may at times be misleading. In thick weather, when near or closing the land, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By laying the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart, keeping the line representing the track parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined. This plan was suggested by Lord Kelvin, whose admirable sounding machine renders the operation of sounding possible in quite deep water, without slowing down the ship and consequent loss of time.

Pelorus.—All ships should be supplied with the means of taking accurate bearings both by night and by day. The standard compass is not always conveniently placed for the purpose; in such case a pelorus will be very useful, but the results are not as accurate as those obtained direct from the compass. The utility of such an instrument in ascertaining the change of bearing of an approaching ship should not be overlooked.

Position lines.—Among the various methods of fixing position at sea, the one which should be best understood and put to the most constant use is that employing position or Sumner lines. These lines give the most comprehensive information to the navigator with the least expenditure of labor and time. The knowledge gained is that the vessel must be somewhere on the line, provided the data used is accurate and the chronometer correct. As the information

given by one line of position is not sufficient to determine the definite location of the vessel, it is necessary to cross this line by another similarly obtained, and the vessel being somewhere on both must be at their intersection. However, a single line, at times, will furnish the mariner with invaluable information; for instance, if it is directed toward the coast, it marks the bearing of a definite point on the shore, or if parallel to the coast, it clearly indicates the distance off, and so will often be found useful as a course. A sounding taken at the same time with the observation will in certain conditions prove of great value in giving an approximate position on the line.

The easiest and quickest way to establish a line of position is by employing the method of Marcq St. Hilaire, as modified by the use of tables of altitude. The principle of this method is one of altitude differences, in which the observed altitude is compared with the computed altitude for a dead reckoning, or other selected position, and the difference in minutes of latitude measured toward the body along the line of its azimuth, if the observed altitude is greater than the computed altitude, and vice versa. A line drawn at right angles to the line of azimuth through the point thus determined is the position line, somewhere upon which will be found the position of the vessel. The tables of altitude obviate the computation of the altitude and thereby greatly facilitate the establishment of the line.

A position line may also be found by computing two positions for longitude with two assumed latitudes, and drawing the line between them; or by drawing to the position obtained with one latitude a line at right angles to the bearing of the body as taken from the azimuth tables.

A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The position lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

The morning and evening twilight observations, besides their great accuracy, possess the additional advantage of greatly extending the ship's reliable reckoning beyond the limits of the ordinary day navigation, and correspondingly restricting the dead reckoning uncertainties of the night. An early morning fix in particular is often of great value. Though the same degree of

accuracy as at twilight can not be expected, night observations are very valuable and should be assiduously practiced.

Piloting.—The navigator, in making his plan for entering a strange port, should give very careful previous study to the chart and sailing directions, and should select what appear to be the most suitable marks for use, also providing himself with substitutes to use in case those selected as most suitable should prove unreliable in not being recognized with absolute certainty. Channel buoys seen from a distance are difficult to identify, because their color is sometimes not easily distinguished and they may appear equally distant from the observer even though they be at widely varying distances. Ranges should be noted, if possible, and the lines drawn, both for leading through the best water in channels, and also for guarding against particular dangers; for the latter purpose safety bearings should in all cases be laid down where no suitable ranges appear to offer. The courses to be steered in entering should also be laid down and distances marked thereon. If intending to use the sextant and danger angle in passing dangers, and especially in passing between dangers, the danger circles should be plotted and regular courses planned, rather than to run haphazard by the indications of the angle alone, with the possible trouble from bad steering at critical points.

The ship's position should not be allowed to be in doubt at any time, even in entering ports considered safe and easy of access, and should be constantly checked, continuing to use for this purpose those marks concerning which there can be no doubt until others are unmistakably identified.

The ship should ordinarily steer exact courses and follow an exact line, as planned from the chart, changing course at precise points, and, where the distances are considerable, her position on the line should be checked at frequent intervals. This is desirable even where it may seem unnecessary for safety, because if running by the eye alone and the ship's exact position be immediately required, as in a sudden fog or squall, fixing at that particular moment may be attended with difficulty.

The habit of running exact courses with precise changes of course will be found most useful when it is desired to enter port or pass through inclosed waters during fog by means of the buoys; here safety demands that the buoys be made successively, to do which requires, if the fog be dense, very accurate courses and careful attention to the times, the speed of the ship, and the set of the current; failure to make a buoy as expected leaves, as a rule, no safe alternative but to anchor at once, with perhaps a consequent serious loss of time.

In passing between dangers where there are no suitable leading marks, as, for instance, between two islands or an island and the main shore, with dangers extending from both, a mid-channel course may be steered by the eye alone with great accuracy, as the eye is able to estimate very closely the direction midway between visible objects.

In piloting among coral reefs or banks, a time should be chosen when the sun will be astern, conning the vessel from aloft or from an elevated position forward. The line of demarcation between the deep water and the edges of the shoals, which generally show as green patches, is indicated with surprising clearness. This method is of frequent application in the numerous passages of the Florida Keys.

Changes of course should in general be made by exact amounts, naming the new course or the amount of the change desired, rather than by ordering the helm to be put over and then steadying when on the desired heading, with the possibility of the attention being diverted and so of forgetting in the meantime, as may happen, that the ship is still swinging. The helmsman, knowing just what is desired and the amount of the change to be made, is thus enabled to act more intelligently and to avoid bad steering, which in narrow channels is a very positive source of danger.

Coast piloting involves the same principles and requires that the ship's position be continuously determined or checked as the landmarks are passed. On well surveyed coasts there is a great advantage in keeping near the land, thus holding on to the marks and the soundings, and thereby knowing at all times the position, rather than keeping offshore and losing the marks, with the necessity of again making the land from vague positions, and perhaps the added inconvenience of fog or bad weather, involving a serious loss of time and fuel.

The route should be planned for normal conditions of weather, with suitable variations where necessary in case of fog or bad weather or making points at night, the courses and distances, in case of regular runs over the same route, being entered in a notebook for ready reference, as well as laid down on the chart. The danger circles for either the horizontal or the vertical danger angles should be plotted, wherever the method can be usefully employed, and the angles marked thereon; many a mile may thus be saved in rounding dangerous points with no sacrifice in safety. Ranges should also be marked in, where useful for position or for safety, and also to use in checking the deviation of the compass by comparing, in crossing, the compass bearing of the range with its magnetic bearing, as given by the chart.

Changes of course will in general be made with mark or object abeam, the position (a new "departure") being then, as a rule, best and most easily obtained. The pelorus should be at all times in readiness for use, and the chart where it may be readily consulted by the officer of the watch. The sextant should also be kept conveniently at hand.

A continuous record of the progress of the ship should be kept by the officer of the watch, the time and patent-log reading of all changes of course and of all bearings, especially the two and four point bearings, with distance of object when abeam, being noted in a book kept in the pilot house for this especial purpose. The ship's reckoning is thus continuously cared for as a matter of routine and without the presence or particular order of the captain or navigating officer. The value of thus keeping the reckoning always fresh and exact will be especially appreciated in cases of sudden fog or when making points at night.

Where the coastwise trip must be made against a strong head wind, it is desirable, with trustworthy charts, to skirt the shore as closely as possible in order to avoid the heavier seas and adverse current that prevail farther out. In some cases, with small ships, a passage can be made only in this way. The important saving of coal and of time, which is even more precious, thus effected by skillful coast piloting makes this subject one of prime importance to the navigator.

Change in the variation of the compass.¹—The gradual change in the variation must not be forgotten in laying down on the chart courses and bearings. The magnetic compasses placed on the charts for the purpose of facilitating the plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The date of the variation and the annual change, as given on the compass rose, facilitate corrections when the change has been considerable. The compasses are reengraved once in ten years; more frequent alterations on one spot in a copperplate would not be practicable.

The change in the variation is in some parts of the world so rapid as to need careful consideration, requiring a frequent change of the course. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles.

Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the

¹ See H. O. Chart No. 2406, Variation of the compass.

ship. Observation shows that disturbance of the compass in a ship afloat is experienced in only a few places on the globe.

Magnetic laws do not permit of the supposition that the visible land causes such disturbance, because the effect of a magnetic force diminishes so rapidly with distance that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot; but the area of disturbance will be small unless there are many centers near together.

Use of oil for modifying the effect of breaking waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skillfully applied, may prevent much damage both to ships, especially of the smaller classes, and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when no other oil is obtainable, or it may be mixed with other oils; all animal and vegetable oils, such as waste oil from the engines, have great effect.
4. In cold water, the oil, being thickened by the low temperature and not being able to spread freely, will have its effect much reduced, a rapid-spreading oil should be used.
5. A small quantity of oil suffices, if applied in such a manner as to spread to windward.
6. It is useful in a ship or boat either when running, or lying-to, or in wearing.
7. When lowering and hoisting boats in a heavy sea the use of oil has been found greatly to facilitate the operation.
8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to permit leakage. The waste pipes forward are also very useful for this purpose.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside, bearing in mind that her natural tendency is always to forge ahead. If she is aground the effect of oil will depend upon attending circumstances.

11. For a boat riding in bad weather to a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat, and the bag readily hauled on board for refilling, if necessary.

CHAPTER I.

GENERAL REMARKS; TRADE; CURRENCY; DOCKS; COAL; STANDARD TIME; BUOYAGE SYSTEM SIGNALS; PILOT AND FISHING LIGHTS; SOUNDINGS; COMMUNICATION; WINDS AND WEATHER, THE BORA, ETC.; CURRENTS; TIDES; NAVIGATION OF THE ADRIATIC.

General remarks.—The portion of the Mediterranean Sea described in this volume comprises the south coast of Italy, Adriatic Sea, the Ionian Islands, the coast of Albania, the gulfs of Arta and Corinth, and the western and southern coasts of Greece as far as Cape Matapan, the southern extremity of the Peloponnesus (Morea). The limits and distinctive features of the south coast of Italy and shores of the Adriatic are so very marked and important that while the first chapter is chiefly devoted to a general outline of its peculiarities the details occupy the following nine chapters, the remaining three being devoted to the description of that part of the Albanian coast lying southward of the Adriatic Sea, the Ionian Sea and islands, coasts of Greece, etc., as enumerated above.

Adriatic Sea.—The Adriatic Sea or Gulf of Venice is the great expanse of waters which, branching off northwestward from the main body of the Mediterranean Sea, is bounded by Italy on the west and by the Austrian provinces and Albania on the east.

The name Adriatic is derived from the city of Adria or Hadria, founded in 1376 B. C. by an Etruscan colony and once the most important town in the Adriatic, but now in ruins, some 15 miles inland at the upper part of the Gulf of Venice. The latter name is of course derived from the city of Venice, which was for centuries the chief city in the Mediterranean; it is now usually applied only to the gulf or bay at the head of the Adriatic on the shores of which Venice stands.

Extent.—The Adriatic, from its southern limit between Cape Santa Maria di Leuca and the island of Corfu to its northern termination at the Venetian shore and Gulf of Trieste, is about 460 miles in length in a general northwesterly direction. From Brindisi, in Italy, and Durazzo, in Albania, the sea northwestward is bounded by two nearly parallel shores, the general breadth being about 90 miles, and the greatest, between Fano and Novi, 110 miles. The narrowest part is at the entrance between Capes Otranto and Linguetta, distant apart rather less than 40 miles.

The Basin of the Adriatic is said to be slowly diminishing in size. There are numerous evidences of encroachment of the land on the sea through the deposit of soil by rivers. From Ancona northward numerous streams swollen to torrents by rains in the Apennines carry vast quantities of deposit into the sea; and, owing to the peculiar situation of the high mountains of Illyria, the head of the Gulf of Venice receives all the waters flowing from the southern declivities of the Alps and of the Carniola Mountains, situated between the Po and the Isonzo; here also flow out the Adige, Brenta, Piave, Livenza, Tagliamento, and numerous minor streams, each carrying down, in freshets, great quantities of alluvium, mud, and gravel, into the lagoons, and forming vast shallows which border the intervening shore.

The effect of this deposit is perceptible along the greater part of the coast of Italy, but especially so between Maestra and Sdobba Points. Thus, Aquilea, which once may have stood near the sea, has long been an inland town, while the harbors of Liquentio, Romantino, and Timaro, said by Pliny to have existed on this coast, have entirely disappeared; and Adria, which was a station for the Roman fleet, is now, as before stated, 15 miles inland. Another town of the name of Spina, formerly bordered by quays, is now completely buried under the sands. Ravenna, built on islands and piles on the margin of the sea, was, in the time of Theodosius the Great, a military port subject to the influence of the tide; it is now between 4 and 5 miles inland, in the midst of gardens and fields. Portus Classis, its ancient harbor, has become a marsh 4 miles from the sea, from which it is separated by the Pineto or pine forest. These flat lands are subject to malaria in summer.

The color of the Adriatic, when undisturbed by an accidental or local cause, is darker than the general color of the Mediterranean, being of greenish hue. The specific gravity at its mouth has been found to be 1.0291, at the depth of 40 fathoms.

Coast.—The two shores of the Adriatic differ entirely in aspect and character, the eastern shore being generally rocky, replete with islands and ports bold of approach, but deficient in inhabitants, provisions, and in many parts, fresh water; the Italian shore, on the contrary, is comparatively shallow, almost destitute of large ports, yet in most parts populous and abounding in provisions, water, and articles of trade. This peculiarity has so great an influence on the navigation of the sea that mariners can not be too careful in making themselves acquainted with the advantages and inconveniences presented by the two shores before they decide on their route.

The Western shore of the Adriatic is the Italian seaboard beginning at Cape Santa Maria di Leuca in the southeast and termi-

nating to the northwestward at Port Buso, the entrance of the River Ausa, at the boundary between Italy and Austria.

It is generally low and trends in a northwesterly direction as far as Ravenna, from whence it bends northward forming the Venetian shore. Its general uniformity is broken chiefly at three places: First, at Mount Gargano or San Angelo, near the Tremiti Islands; secondly, at Mount Conero, between Loreto and Ancona; and, thirdly, at the delta formed by deposits at the mouths of the Po. The two first being high and terminating in well-defined elevations, are excellent landmarks. The celebrated chain of the Apennines runs almost parallel to the Abruzzo coast between these two elevations. The summits of Mount Corno or Gran Sasso d'Italia, 9,560 feet high, and of Mount Majella (9,160 feet), which are its highest points, are remarkable, and may be seen at a great distance in clear weather.

The shore consists chiefly of sandy beaches, and, with the exception of the two points where the land rises, the soundings along it are regular, with a shallower approach than on the opposite coast. Roadsteads are scarce; there are many harbors, of which a few only are capable of admitting large vessels, but which, chiefly by artificial means, have been made suitable to the busy trade carried on along this thickly populated shore. The most important products exported are corn, rice, fruit, oil, wine, cotton, wool, silk, and salt. The great lakes Varano and Lesina, between the village of Peschici and the town of Termoli, have long been celebrated for the abundance, variety, and excellence of their fish; the margins of the lakes are said to be unhealthful.

As has been already stated, the great number of rivers and streams intersecting the northwestern portion of this coast from Ancona to the Isonzo River, near the head of the Gulf of Trieste, bring down quantities of sand and mud, causing the shore to be encumbered by shallows, and nearly all the harbors to be more or less obstructed. The Italian coast is, however, always easily navigable in fine weather, and can be approached sufficiently near for the recognition of its most conspicuous objects, which may generally be seen from a distance of 10 to 12 miles.

The Eastern shore of the Adriatic embraces the Austrian dominions of Istria, Croatia, Dalmatia, Ragusa, and the mouths of the Cattaro, a short strip of Montenegrin seaboard, and part of Albania. It is in general high and picturesque, with almost perpendicular cliffs, and very deep water along the shore. To these features, however, there is an exception between the Gulf of Drin and Cape Linguetta, where the shore is low and sandy, and the water is not so deep. This coast also runs almost southeastward and northwestward, and in some places forms deep bays. From Cape Promontore to Ragusa it is entirely bordered by islands, rocks, and shoals, which

render the navigation intricate and often unsafe when overtaken by the Bora.

Mariners, notwithstanding, give the preference to the eastern coast, particularly during the winter season, as it has good harbors and, in many parts, affords shelter in bad weather, while on the western coast the only ports available for vessels of the deepest draft are Brindisi and Ancona, and the open anchorage in the Gulf of Manfredonia, and even these are often difficult of access.

The water on almost every part of the coasts of Istria, Croatia, and Dalmatia, to the Gulf of Drin and between the islands is generally deep very near the land; but between the Gulf of Drin and Cape Linguetta, as before mentioned, the shore is not so bold, being bordered by shallow water with moderate depths extending some distance seaward.

The greater part of the eastern coast of the Adriatic is barren and uninhabited, and the trade insignificant; with the exception of Trieste, Fiume, and Valona, the inhabitants of almost all the towns and islands are poor, and provisions, including water, are generally difficult to be obtained.

Coast of southern Albania and Greece.—Southward of Cape Linguetta the coast trends south-southeastward about 260 miles to Venetico Island, the Gulfs of Arta, Patras, and Corinth being within this space, and the coast being fronted by six of the seven Ionian Islands. From Venetico, with the deep Gulf of Kalamata intervening, Cape Matapan lies to the southeastward, distant 35 miles.

The features characteristic of this coast line are much the same as those of the eastern side of the Adriatic, viz, a high and picturesque seaboard, sparsely populated, deep water close inshore, and a lofty mountainous interior visible when 60 or 80 miles distant seaward. The exceptions as regards the seaboard are chiefly in the neighborhood of the entrances to the Gulfs of Prevesa and Patras where the land is low and marshy.

Soundings.—In general, the soundings along shore are in accord with the general character of the coast. Where the land is high and rocky, deep water will be found, and vessels may approach to a prudent distance; where it is low, level, and sandy, the water is shallow.

Soundings in the Adriatic.—The shoalest water in the Adriatic is in the Gulfs of Venice and Trieste, and especially along the Venetian shore and at the mouths of the Po. The nature of the ground follows an almost uniform rule along the whole of this coast; fine sand is found near the beach, seaward of which sand mixed with mud, and lastly mud; in some few places the bottom is clay covered with soft mud, and sometimes marl intermixed with sand and clay. The distance to which these several zones extend varies according to

the strength of the current inshore and its extension seaward. Mud bottom, suitable for anchorage, will almost always be found between the distance of 1 to 3 miles from the land, and the nature of the bottom is mud nearly everywhere toward the middle of the Adriatic.

But little difference exists between the matter of which the nearly horizontal layers of the bed of the Adriatic is composed and that of the surrounding continent, islands, and rocks. A white marble of uniform grain, resembling the substance of the Istrian, Morlacca, and Dalmatian countries often occurs; in some places are found gravel, sand, and other matters more or less metalliferous. Near the beginning of the eighteenth century, Vitaliano Donati invited attention to the formation of a concretion of crustaceans, testaceans, and polyps, partially petrified and intermixed with earth, which is said to be increasing and may have the effect of gradually decreasing the depth.

An extensive bank of mud intermixed with chalky and other matter, which by gradual growth may eventually form an island, has risen in the middle of the Gulf of Venice, where the depths are less than in other parts of the Adriatic.

A depth of from 460 to 470 fathoms is found in the entrance to the Adriatic about midway between Capes Linguetta and Otranto. From thence to a line connecting Gargano Head and Meleda Island, the whole central portion of the gulf consists of a deep basin of from 550 to 680 fathoms, and with an extreme depth of 869 fathoms at one spot about 35 miles northeastward of Brindisi. This basin terminates northwestward in a narrow tongue over 100 fathoms deep, passing northeastward of the Pelagosa Islands. Between Ortona on the Italian and Sebenico on the Dalmatian shore, another deep of from 80 to 133 fathoms almost crosses the gulf; but northwestward of this line the water soon shoals to from 50 to 60 fathoms, and thenceforward its central depth continues to shoal gradually and evenly toward the head of the gulf.

The line of deepest soundings, after passing about 30 miles southward of the island of Meleda and southward of Lagosta, between Cazza and Pelagosa, takes a northwesterly direction; very near Pomo Islet the depth is about 100 fathoms. This line of comparatively deeper soundings then crosses the deep before described and approaches the Dalmatian coast, passing about 10 miles westward of Incoronata Island, from whence it takes nearly a middle course, though bordering on the eastern shore of the sea, to the parallel of Cape Promontore; at 25 miles westward of which cape the depth is about 25 fathoms, gradually decreasing toward the Gulf of Trieste.

In the Gulf of Venice the water shoals very gradually, the depth varying between 9 and 25 fathoms; relatively to the rest of the Adriatic this part appears to be, as a submarine plateau, a continuation of the great plains of Lombardy and Friuli.

Soundings southeastward of the Adriatic.—The great depths of the eastern basin of the Mediterranean border the western shores of the Ionian Islands and the western and southern shores of the Peloponnesus (Morea), consequently the soundings in the vicinity of these coasts, sometimes called the Ionian Sea, are very deep. At 5 miles westward of Fano, the northwestern islet of Corfu, 574 fathoms have been found; 12 miles westward of Paxo, 645 fathoms; 8 miles westward of Cephalonia, no bottom with 1,300 fathoms of line; off the Gulf of Arcadia, at from 15 to 20 miles from the shore, from 600 to 900 fathoms; and, as the southwestern extreme of the Morea is approached, the depths become still greater, over 2,000 fathoms being found 7 miles southwestward of Sapienza and 1,500 fathoms within $3\frac{1}{2}$ miles of that island. At 6 miles southward of Cape Matapan the depth is 1,035 fathoms, but 10 miles westward of that cape it is 560 fathoms, though between this spot and the deep soundings off Sapienza nothing less than 1,000 fathoms is known to exist.

Following the 100-fathom curve of soundings southeastward from Fano, it is found to be within 1,200 or 1,400 yards of the western extremity of that island; passing Corfu, it is at places less than 1 mile from the shore and nowhere more than $3\frac{1}{2}$ miles; it skirts Paxo and Anti-Paxos at from 1,000 yards to 1 mile and then curves in eastward, but is distant about 8 miles from the mainland abreast of the Gulf of Prevesa; from thence it trends southward, closely bordering the coasts of Santa Maura, Cephalonia, and Zante, in some places scarcely 200 yards distant from the shore. Between Zante and the mainland of the Morea, 9 miles distant, the depth is from 250 to 300 fathoms; but again following the 100-fathom curve along the shore of the Morea to Cape Matapan from Cape Trepito opposite Zante, where it is less than 1 mile from the shore, it is found to be nowhere more than 5 miles from the land at the head of the bays, and from the headlands only 1 or 2 miles, and considerably less than that on the southern coast.

With the exception of the Gulf of Arta, where the depths are very moderate, about 36 fathoms being the maximum, the soundings in all the channels inside the Ionian Islands and in the gulfs and bays comprised within the limits of this description are uniformly deep, but they are more particularly dealt with in detail hereafter.

Islands.—Almost all the islands of the Adriatic are along the eastern coast between Ragusa and Cape Promontore. They are very numerous, and appear to have originated in the breaking up of the lower grounds by some violent action, which has left their limestone summits above water. By the salient position of the promontory terminating in Planka Point, they are divided into two distinct groups. The principal islands lying southward of Planka Point are Meleda, Curzola, Lesina, Brazza, Lissa, and Lagosta; northward

of the point, the most important are Zuri, Incoronata, Grossa, Cherso, Veglia, Pago, and Lussin.

All these islands are narrow in proportion to their length, their general direction being nearly parallel with the coast line, and various channels, generally named after the nearest adjacent island, lie between them, which channels being deep, with but few hidden dangers, afford a variety of secure passages. The islands abound with ports and harbors, of which some are of considerable capacity.

Near Gargano Head, on the Italian coast, are the Tremiti Islands, a group of four islets, under whose southern side good shelter from the Bora may be found. Southward of Lissa is the isolated rocky isle of Pelagosa, nearly in the middle of the Adriatic, and, between it and the Tremiti Islands, the low and dangerous Pianosa Islet; lastly, west-northwestward of Lissa is Poma, a high pyramidal rock, and between Lissa and Pomo is St. Andrea Islet.

Southward of the entrance to the Adriatic and fronting the Albanian and Greek coasts are the Ionian Islands; Corfu, on the north; then Paxo and Anti-Paxos; Santa Maura, only separated from the mainland at its northern end by a boat canal; Cephalonia and Ithaca, immediately fronting the entrance to the Gulf of Patras; and Zante, 8 miles farther southward. Of these Corfu, Santa Maura, Cephalonia, and Zante are all very mountainous, Cephalonia being the highest; they are populous and have excellent harbors; their soil is generally fertile and their scenery unsurpassed in any part of the world. Between these islands and the mainland are many smaller islands, rocks, and islets, but none at any distance outside them except where Samothraki, Fano, and Merlera, with other small islets, having deep channels between them, occupy a space extending 15 miles from the northwestern coast of Corfu; and, again, 24 miles southward of Zante, where the little Strovathi group of rocky islets, of which Stamphani, the largest, is less than 1 mile in extent, lie off the Gulf of Arcadia, 27 miles from the nearest land of the Peloponnesus (Morea), and are surrounded by deep water, the 100-fathom curve being only 400 or 600 yards distant from their southwestern side and at no other part more than $\frac{3}{4}$ mile.

Gulfs.—The smaller gulfs within the Adriatic are: The Gulf of Manfredonia, the only one on the Italian coast, lying southward of Gargano Head, between it and the town of Trani; it recedes about 17 miles westward from that line. The shallow Gulf of Venice, included between Tagliamento and Maestra Points receding about 20 miles from this line, its depth of water within this limit nowhere exceeding 15 fathoms. The Gulf of Trieste, in the most northern part of the sea, extending 20 miles east-northeastward and comprised between Tagliamento Point on the north and Salvore Point in Istria, about 18 miles apart, the depth of water within these limits, as in the Gulf of Venice, being everywhere less than 15 fathoms.

The Gulf of Quarnero is separated by the peninsula of Istria from the Gulf of Trieste; from thence it extends about 60 miles southeastward and is contained between Cape Promontore, the land of Nona, and Grossa Island. It is in great part occupied by islands, from the four most important of which, Cherso, Veglia, Arbe, and Pago, the gulf is said to derive its name.

The small Gulf of Cattaro, a peculiarly formed basin, indented and surrounded by steep cliffs, is on the eastern coast of the Adriatic, overlooked by the lofty and rugged mountains of Montenegro. Fifty miles farther southward, between Menders Point and Cape Rodoni, is the Gulf of Drin, affording good anchorage with off-shore winds.

Southward of the Adriatic is the Gulf of Arta, which is entered by the Strait of Prevesa; it recedes about 20 miles from the coast line, and its shores abound in interesting remains of antiquity.

About 40 miles farther southward is the Gulf of Patras, which extends eastward about 30 miles from the Island of Oxia at its entrance, and is itself the entrance channel to the Gulf of Corinth, or Lepanto. It varies in width from about 6 to 10 miles, and narrows to but little more than 1 mile at its eastern end. The town of Missolonghi is on its northern side, in the rear of salt marshes and lagoons; and on its southern shore is the important town of Patras, one of the most thriving in Greece.

The Gulf of Corinth, from its entrance between Rumelia and Morea Castles, recedes nearly 70 miles east-southeastward, and has an average width of about 10 miles, with some deep bays, especially on its northern shore. At its southeasterly corner it is only separated from the Gulf of Athens on the opposite side by the Isthmus of Corinth, about 3.1 miles wide. The shores on both sides consist of lofty rugged mountains, with narrow cultivated plains and rough torrent beds bordering the shores. The depths are generally very great and the shores steep-to. The principal ports are Vostitza on the southern shore, Galaxidi and Salona on the northern; the last within an easy ride of the ancient oracle of Delphi.

On the western coast of the Morea is the Gulf of Arcadia, which would be more correctly termed a bay; and, on its southern coast the deep gulf of Kalamata, separated from the Gulf of Kolokithia by the Mani Peninsula which terminates in Cape Matapan. With the exception of the rather important town of Kalamata, these gulfs are so destitute of good ports, and, owing to the general sterility of the rugged land, so thinly populated, that they are of but small importance to the mariner.

Communication—Railroads.—On the Italian shore intercourse either by land or water is carried on with great facility. The coast line railroad commencing at Brindisi, with a branch line southward

to Otranto and westward to Taranto, passes through or within easy reach of nearly all the ports in this populous district as far northward as Rimini, with several branches connecting it with the large towns of the interior. The marshy lands, streams, and lagoons round the northwestern end of the Adriatic interrupt and do away with the need of a coast railroad at this part; but Venice itself is connected with the system of the mainland by a viaduct 4,000 yards in length, across the lagoons. From Venice eastward the same natural difficulties exist up to and beyond the Austrian frontier at Port Buso.

Trieste, the principal commercial port of Austria, is in direct communication with Vienna by the Austro-Hungarian system, as are also Rovigo and Pola in the Istrian Peninsula, and Fiume in the gulf of that name, from whence the railroad turns inland, connecting this latter port with Agram and Budapest, the capital of Hungary. From Fiume southward the whole eastern coast of the Adriatic is destitute of railroad accommodation, with the exception of a short line connecting Sebenico and Spalato, and both these ports with the town of Knin in the interior. There is, however, a railroad with terminus at Metkovic and Herzegovina, situated 8 miles from the coast southeastward of Port Tolero, which runs to Mostar and Seraievo; also a narrow-gauge line from Antivari to Vispazar on Lake Scutari.

Beyond the southern limit of the Adriatic, the same want of railroad accommodation exists in Albanian and Greek territory until southward of the Gulf of Corinth, there being none whatever between Spalato and that gulf, except that above mentioned between Metkovic and Seraievo, nor in any of the Ionian Islands. In the Morea, however, on the southern shore of the Gulf of Corinth, runs the direct railroad from Athens, connecting Vostitza, Patras, Katakolo, and Pyrgos with that city, and also with the important port of Nauplia on the eastern coast of the Morea, which latter port is also in connection with Kalamata on the southern coast.

Roads.—Where railroads are wanting in Italian or Austrian territory, it may generally be taken for granted that good roads are available; but in Montenegrin, Albanian, or Greek territory the reverse will be the case, especially with the two former.

Steamers.—The numerous lines of steamers render water communication easy and frequent over the whole extent of coast embraced in this volume, and, so far as the rugged eastern coast of the Adriatic and the Albanian, Montenegrin, and Greek seaboard are concerned, make ample amends for the want of intercourse by land. The principal ports are Brindisi, Ancona, and Venice, in Italy; Trieste, Pola, and Fiume in Austrian territory; Corfu, Zante, Vostitza, Patras, and Kalamata in the Kingdom of Greece. Four large steamship companies—the Peninsular Oriental, Austrian

Lloyd's, Florio-Rubattino, and the Italian Steam Navigation Co., besides the Leyland, Burns and McIver, and many smaller ones—supply convenient means of transit between these ports, the islands, and the innumerable smaller ports, as will be seen in the detailed description of these places. The eastern coast of the Adriatic and the Albanian and Greek ports are specially well served by the Austrian Lloyd's steamers, and by small local steamers which call at all the islands off the Dalmatian and Croatian coasts, as well as at the small ports on the mainland. These were the conditions before the European war.

Telegraph.—Telegraphic communication is universal in Italian and Austrian territory, all the principal islands being in connection with each other and with the mainland by cable, as are also Corfu, Cephalonia, and Zante in Greek waters, the latter communicating also with Malta and with Taranto in Italy. Telegraph offices will also be found at all Greek ports of the least importance. Prevesa and some of the principal Albanian ports are also in telegraphic communication with the interior.

The following telegraph offices on the seacoast are open all night: Ancona, Bari, Brindisi, Cattaro, Corfu, Giulianova, Gravosa, Kalamata, Nabresina, Otranto, Patras, Pola, Ragusa, Rimini, Spalato, Trieste, Valona, Venice, and Zara. Those offices open until midnight are: Abbazia, Amphissa, Argostoli, Barletta, Cephalonia-Chalcis, Corinth, Gallipoli, Lepanto, Leucadia, Marano, Missolonghi, Naupaktos (Lepanto), Pesaro, Trani, Vostitza, and Zante.

Semaphore or Signal stations.—On the Italian coast, semaphore stations are generally (but not always) painted in black and white checkers. Vessels can communicate with the semaphore stations by means of the International Code of Signals, and a passing vessel can communicate with its owner or receive a message from him by the same means. Payment is made according to a fixed tariff. (See H. O. No. 87 International Code of Signals.)

The working hours are, as a rule, from sunrise to sunset, but should vessels be in sight the hours will be extended until such vessels are no longer visible; the hours are also extended should there be any special technical, military, commercial, or private reasons.

Submarine cables.—On the coast of Italy the landing place and first direction of submarine cables are marked by two beacons in range; as a rule the beacons are posts, each surmounted by a framework painted white, one of which having the letter T on it painted black. There is also a board where each cable is landed, with notice that anchorage is prohibited near the cable.

Italian ports—Regulations.—The following regulations for foreign vessels of war anchoring in Italian ports in time of peace have been issued by the Italian Government.

1. Foreign vessels of war can not remain at fortified ports for a period of more than eight days, and not more than three vessels of the same flag may assemble at these anchorages, unless formal permission, which must be applied for through a diplomatic channel, has been received.

2. Venice, and the anchorage in the lagoons, is the only fortified Italian naval station in the area included in this volume, and it, as well as Ancona, together with any anchorage where an Italian man-of-war, capable of returning salutes, is lying, is to be saluted by foreign vessels of war which are in a position to do so.

3. Foreign vessels of war anchored in any of the above-mentioned places must leave at any time if requested, and at the expiration of the period stated in Article I.

4. The naval authorities will probably send an officer to point out the anchorage assigned to the vessel, but in the event of this not being done anchorage may be taken up as convenient.

5. Should pratique be refused, the medical officer of the vessel should be sent to the local sanitary office to ascertain the treatment to which the vessel or vessels are to be subjected, and all port regulations must be carried out.

6. No surveying or hydrographic operations are to be carried on without special permission from the Government, and the following are also forbidden within the territorial waters: (a) The execution of a death sentence. (b) Vessels carrying on hostilities with each other, or bringing prizes or searching vessels. (c) Landing to execute manœuvres on, or gun practice within gun range from the coasts without special permission.

7. With the exception of officers and petty officers the crew of a foreign vessel must always land unarmed, and should it be wished to send an armed funeral party permission must be obtained.

Regulations with regard to vessels approaching fortified ports in state of war. (See Appendix.)

Pilots—Italy.—Pilot boats are painted black with a white stripe, and the word "Pilota" in white on bows and stern, with, in the case of a sailing boat, the letter "P" on each sail, and in a steamer on each side of her funnel. They also carry, in day time, a square flag—blue, white, blue, horizontally.

Vessels requiring pilots by day should either—

- (a) Hoist the national flag on a white ground;
- (b) Make the signal P T; or
- (c) Hoist flag S.

And by night

- (a) Burn a blue light; or
- (b) Show a white light occulted at short intervals.

Pilots are forbidden to take vessels in tow.

Italian coasts—Submarine vessels.—Submarine vessels, when practising submerged, are always escorted by a vessel, usually a torpedo boat, carrying a red square flag at the masthead.

Vessels sighting this escort vessel must keep a lookout for international code signals which she may hoist to indicate that maneuvers are in progress, in order that they may avoid the risk of collision with a submarine vessel. In case of urgency this signal may be accompanied by firing a gun.

It is also necessary to observe carefully the surface of the sea, as the presence of a submarine vessel is often indicated by the end of the periscope emerging a foot or two above the surface. In ordinary practices the periscope is surmounted by a staff 10 feet in height with a small triangular metal flag.

Submarine vessels practice daily off the coast of Italy in the approaches to Venice. The semaphores near the area in which the submarines practise here hoist a square red flag during its continuance.

Austria-Hungary—Submarine vessels.—When submarine vessels are practising off the coasts of Austria-Hungary, an escort vessel, carrying a red square flag at the foretopmast head, is stationed in their vicinity.

This escort vessel should be passed by other vessels at a distance of at least 1 mile; should it be impossible to keep outside this distance, vessels approaching must proceed at slow speed until again a mile distant from the escort vessel, keeping a good lookout, and immediately obeying any signals made by her.

Submarine vessels are frequently practising in the Gulf of Quarnero, off the west coast of Istria, and particularly in the vicinity of Pola.

Regulations.—Dredgers and other craft engaged in works in harbors, or in much frequented waters, on the coasts of Austria-Hungary, where liable to be affected by the wash of passing steam vessels, carry the International code signal M F, and all steam vessels in the vicinity must reduce their speed, so as to avoid damage or disturbance of the work. Infringements of this order are punishable with fines up to 200 kronen, or 14 days' arrest, besides paying compensation for any damage occasioned.

Austrian ports—Regulation.—All merchant vessels must fly their national ensigns from sunrise to sunset when in Austrian and Hungarian territorial waters, except when in the following localities, where this regulation is only enforced on entering a harbor:

On the coast of the mainland from Grado to Parenzo, and from Nera Point to Zara Vecchia, also from Trua to Molonta; on the coasts of Veglia Island and of that part of Cherso situated northward of

Cherso village, also on the coasts of all islands southward of Murvica Island; in Zara Channel southward of the line Melada-Nona.

Austrian ports—Harbor regulations.—Every merchant vessel entering a port by day must hoist her national flag and keep it flying until the completion of the sanitary and port official inspection.

The prescribed regulations for lights at night must be observed.

Vessels are not permitted to anchor at the entrance to the port, except in cases of force majeure.

Upon arrival, no communication is permitted with the shore or other vessels until pratique has been received, unless the circumstances and conditions come under the list of exceptions laid down in the port and sanitary regulations. Where no such exceptional circumstances prevail, the captain of a vessel must, immediately on arrival, report himself to the port authority, subject to having passed the sanitary examination.

The captains of vessels having inflammable or explosive materials on board must report the fact.

An anchorage or berth is allotted to a vessel after she has passed the sanitary authorities, and the captain may not move or shift from the place assigned without permission. Vessels ordered by the port authorities to leave their berths must immediately comply.

A vessel moored within the limits of a harbor must allow another vessel to lie alongside, is so ordered by the port authorities. In specialized ports, square-rigged vessels or steam vessels must not moor or unmoor, make fast, or move, without the services of a local pilot.

Obedience to the port authorities is compulsory in all matters relative to sanitary and general conditions.

Vessels secured to buoys must have out as much cable as the force of the wind requires; and in stormy weather not less than 17 fathoms.

In heavy weather a spring must not be taken to any buoy to which another vessel is moored.

Vessels moored to stakes and pillars without rings must take several turns with the hawser around the same, and the methods of mooring are to be such as the local circumstances and the port authorities' regulations require.

Any spring hawser must be let go when a vessel is passing.

Vessels which have not the requisite facilities for mooring will not be allotted a place alongside the quays.

Jib booms and flying-jib booms must be rigged in, and yards braced up or topped when so ordered by the port authorities.

Hawsers must not be taken to any places not intended for that purpose, and no obstructions may be caused by cables, hawsers, etc.

If a vessel has parted from, or is dragging her mooring, or if a vessel is being launched, vessels in her vicinity must temporarily move out of the way.

Naked lights are forbidden on board vessels lying in tiers alongside quays or canals, and permission must be obtained to light a fire in the hold for the purpose of fumigation.

Lading or unlading explosives or inflammables must be carried out under the regulations regarding the same, and during these operations smoking on board the vessel or in her immediate vicinity on shore is prohibited.

Vessels with stores of gunpowder and arms on board for their own use, proceed to the places reserved for such vessels before going alongside the quays; these stores must be placed where authorized, and can only be taken on board again after the vessel has left the wharves and is about to sail.

Cargoes must be discharged or taken on board with all possible speed, and may not remain on the wharves at night, except in unusual circumstances, when the consent of the port authorities may be obtained, subject to the customs' regulations.

Should a vessel, when in the vicinity of the harbor, lose anything overboard and be unable to recover it she must immediately report the loss, in order to obtain permission for the necessary salvage operations, or to secure the services of the port authorities.

The captain of a vessel must give 24 hours notice of his intended sailing, and report as to the dismissal or absence without leave of any of his crew.

STORM SIGNALS.

| Day signal. | Night signal. | Signification. |
|---------------------------------------|---|---|
| A cone, point upward..... | A red light over two white lights, vertical. | Gale probable, commencing from northwest. |
| Two cones, vertical, points upward. |do..... | Gale probable, commencing from northeast. |
| Two cones, vertical, points downward. | Two white lights over a red light, vertical. | Gale probable, commencing from southeast. |
| A cone, point downward. |do..... | Gale probable, commencing from southwest. |
| Two cones, vertical, bases together. | A red light between two white lights, vertical. | Gale probable, direction of wind uncertain. |

Radio.—Stations are established at Ancona, Brindisi, Castelnovo, Centopozzi,* Sebenico, and Trieste. For details *see* the respective places.

Communication to Italian stations for mercantile purposes should not be made from a greater distance than 45 miles except in urgent cases; the limit under normal conditions is less than 70 miles. On

establishing communication vessels should signal their distance from the station, and the longitude of all positions should be given from the meridian of Greenwich.

A vessel in distress should make the signal S. O. S. repeating it at intervals of a few seconds, and on receiving a reply, S. O. S. should be repeated; then the nature of the damage and the assistance required should be given.

FIRST GROUP.

The first three figures indicate the barometer at 0 or sea level, thus: Bar. 745.8 mm. is given 458; Bar. 776.3 mm. is given 763.

The last two figures indicate the direction of the wind as shown in the accompanying table:

| | | | | | | | |
|--------------|----|--------------|----|--------------|----|--------------|----|
| N. N. E..... | 02 | E. S. E..... | 10 | S. S. W..... | 18 | W. N. W..... | 26 |
| N. E..... | 04 | S. E..... | 12 | S. W..... | 20 | N. W..... | 28 |
| E. N. E..... | 06 | S. S. E..... | 14 | W. S. W..... | 22 | N. N. W..... | 30 |
| E..... | 08 | S..... | 16 | W..... | 24 | N..... | 32 |

Calm is expressed by 00.

SECOND GROUP.

The first figure indicates the strength of the wind in accordance with a scale similar to the Beaufort scale, beginning with Calm 0 and extending to 9.

The second figure indicates the state of the sky or weather in accordance with the following table:

| | | | |
|---|-------------------------|---|-----------------|
| 0 | Fair or clear. | 5 | Rain. |
| 1 | One-fourth overcast. | 6 | Snow. |
| 2 | One-half overcast. | 7 | Thick or misty. |
| 3 | Three-fourths overcast. | 8 | Fog. |
| 4 | Overcast. | 9 | Thunderstorm. |

The third and fourth figures indicate the temperature (centigrade), and in cases of less than 10° are given thus: 9° as 09, 5° as 05, etc., while temperatures below 0° have the number 50 added in each case, thus, —6° is given as 56, —11° as 61, etc.

The fifth figure indicates the state of the sea and is given in accordance with the following table:

| | | | |
|---|---------------------|---|-------------------|
| 0 | Calm. | 5 | Strong seas. |
| 1 | Nearly calm. | 6 | Heavy seas. |
| 2 | Slightly disturbed. | 7 | Very heavy seas. |
| 3 | Lightly disturbed. | 8 | Stormy seas. |
| 4 | Disturbed. | 9 | Very stormy seas. |

The following is a graphic illustration of this method:

SIGNAL NOVEMBER 11, 1913.

| | |
|--------|-------|
| 647 00 | 08130 |
| 641 16 | 44164 |
| 647 16 | 14144 |
| 664 12 | 31173 |
| 663 32 | 12153 |
| 656 32 | 14100 |
| 652 16 | 34133 |
| 000 20 | 28131 |
| 670 00 | 00130 |
| 668 28 | 32191 |

INTERPRETATION.

| Place. | Bar. | Direction of wind. | Strength of wind. | Sky. | Temp. | State of sea. |
|------------------|-------|--------------------|-------------------|--------------------------|-------|--------------------|
| Trieste..... | 764.7 | Calm.. | 0 | Fog..... | +13 | Calm. |
| Pore..... | 764.1 | S..... | 4 | Overcast..... | +16 | Disturbed. |
| Fiume..... | 764.7 | S..... | 1 | do..... | +14 | Do. |
| Lissa..... | 766.4 | SE..... | 3 | One-fourth overcast..... | +17 | Lightly disturbed. |
| Pt. D'Ostro..... | 766.3 | N..... | 1 | One-half overcast..... | +15 | Do. |
| Venice..... | 765.6 | N..... | 1 | Overcast..... | +10 | Calm. |
| Brindisi..... | 765.2 | S..... | 3 | do..... | +13 | Lightly disturbed. |
| Palermo..... | | SW..... | 2 | Fog..... | +13 | Nearly calm. |
| Corfu..... | 767.0 | Calm.. | 0 | Fair..... | +13 | Calm. |
| Alexandria..... | 766.8 | NW..... | 3 | One-half overcast..... | +19 | Nearly calm. |

Signals of distress as follows are made from certain Italian lighthouses and light vessels:

1. A black flag with a white ball in center by day or a white flare by night ----- Doctor needed.
2. A black and white checkered flag by day or a red followed by a white flare by night ----- Apparatus damaged.
3. A black ball by day or a red flare by night ----- Water and provisions required.
4. A black flag with white ball in center above a black ball by day or a white followed by a red flare by night ----- Shipwreck.

In case of light vessels a yellow flare is substituted for the white.

These night signals are repeated every 10 minutes until answered.

Standard time.—The standard time kept in Italy and Austria is mid-European, namely, that of the meridian of longitude 15° east, or one hour fast on mean time of Greenwich.

The time used throughout Greece is that of Athens, or 1h. 34m. 53.7s. fast on Greenwich. In European Turkey the time used is that of Constantinople, of 1h. 55m. 56s. fast on Greenwich.

NOTE.—In 1916-17 a number of European countries adopted a so-called "summer time" which was one hour earlier than the former standard time. It is not known whether this procedure is to be followed in the future.

Time signals, by which vessels can ascertain the errors of their chronometers, are made at mean noon of the meridian of longitude 15° E., from Greenwich, at Venice, Fiume, Lussin, Piccolo, Pola, and Trieste. For particulars, see under the respective ports.

Climate.—The climate of the coasts described in this volume is generally agreeable and salubrious, though at times the heat in summer is excessive; and, during the summer and early autumn months, anchorages near low and marshy lands, especially salt marshes, are to be avoided, low fevers being then very prevalent in their neighborhood. In winter, the changes from fine weather and a moderate temperature to storm and intense cold are sometimes very sudden and trying; these changes are attributable to the mountainous nature of the country contiguous to the coasts. The subject of climate in these seas is, however, inseparable from that of wind and weather, as will appear on perusal of the following pages on those subjects.

Winds and weather.—The navigation of the seas and coasts comprised in this volume are simple and easy in a steamer, but the near neighborhood of high mountainous land in nearly all parts of it has a tendency to make the winds very baffling and uncertain even in fine weather, and to cause heavy local gales and squalls to be both frequent and dangerously sudden; consequently, in a sailing vessel extreme care is required, especially in the Adriatic, where a vessel is so liable to be caught in a gale without sea room, especially during winter. During summer, the winds are light and variable, with frequent calms and occasional squalls from the northward; in winter, in the Adriatic, they are almost always northerly or northeasterly, or else southeasterly with thick fogs and rain.

The winds are very variable at the mouth of the Adriatic, but are steadier in the middle of the sea; they are still more variable at its northern extremity in the gulfs of Venice and Trieste, where it is not unusual, especially near the Po, or Trieste, to see vessels steering toward each other with exactly opposite winds.

Southward of the Adriatic the winds are less variable, and in fine summer weather, and often in winter, land and sea breezes are usual. The prevailing summer wind is between west-southwest and northwest, and belongs to that atmospheric column which traverses the whole length of the Mediterranean from the Strait of Gibraltar to

the coast of Palestine, backing southward of its normal direction during the day and veering northward of it at night. Storms are not frequent and are of short duration in summer, but much more frequent during winter when northwesterly gales sometimes last 3 or 4 days. The winds as they affect the navigation of the coasts of the Peloponnesus (Mores) are more fully treated in Chapter XI.

The weather is exceedingly unsettled along the eastern shore of the Adriatic, between the gulfs of Trieste and Cattaro; in summer calms, thunder, water spouts, and the hot wind which the Sclavonians call *youg*, are frequent; and in winter heavy northerly blasts of the *bora*, with thick fogs and squalls.

From a meteorological journal kept at Venice for five years, it appears that at the head of the Adriatic southerly winds are most frequent during the summer months to September; that the wind is seldom from the northward between April and July; that it is generally variable during 15 days of each month of the year; and, that about 20 days of fine weather, with light breezes or calms, may be depended on in any month of the year. The rain gauge showed that 32 inches of rain fell annually, of which 4 inches were in September, and $6\frac{1}{2}$ inches in October, January, February, May, and December—periods at which southerly winds are not very frequent in the upper part of the gulf. The range of the barometer was but small throughout.

Barometer.—The indications of the barometer should be consulted in navigating these waters. The mercury usually rises with northerly winds and falls with southerly or southeasterly winds. The *bora* generally produces a momentary depression in the mercury; sometimes this fall is very slight and far from adequately announcing the coming storm. Mariners should therefore be on their guard when it falls, though but little, especially if the fall be accompanied by the appearances presently described as precursors of the *bora*.

Winds of the Adriatic.—The most frequent winds in the Adriatic are from between northeast and east-northeast, and from between southeast and south. The former are the more severe and require constant and careful attention; the latter, although less dangerous, are troublesome on account of the sea they raise and the rain which accompanies them. Winds from southwest to northwest blow occasionally, but are less frequent than those from between southeast and northeast, and the duration of westerly to that of easterly winds may be considered as one to three.

Winds from the southward, and especially from the south-eastward, are prevalent at the entrance of the sea, while those from northeast and northwest, particularly in the fine season, are most common in its northern part; it often happens that fresh breezes

from northeast, northwest, and southwest are blowing in different parts at the same time.

The light breezes are generally from the eastward, as in most parts of the Mediterranean; they have the effect of mildewing the sails if the precaution of airing frequently be not taken when westerly or northerly winds set in.

The Bora.—The name bora is generally given in the Adriatic to winds between north and east-northeast. It is dangerous and greatly feared by sailing craft, as it rises suddenly and blows with violence; generally, and especially in winter, it blows with the greatest strength after a strong southeasterly gale, and is most persistent and violent on the eastern coast. Its general direction is across the Adriatic, and the limited breadth of this sea is one of the causes of the risk attending it, for a vessel, unaided by steam and unable to carry sail, may be driven rapidly toward the coast of Italy where there is little shelter for large vessels. Sailing vessels generally let fly everything to receive the first blast, then bear up to the southward for any port they can fetch or remain under bare poles until it is exhausted.

Off the Gulf of Cattaro, the bora, although less violent, sometimes renders it impossible for vessels to carry any sail, even when overtaken at a short distance from land; in this part of the Adriatic, on standing out at once, the wind will very often be found more moderate and a vessel may then run for a shelter or keep at sea.

In winter this wind is to be feared, especially in Vrullja Bay or cove near Makarska, at the mouth of the Narenta, and off the Valley of Giuliana, Sabbioncello; it is also usually exceedingly fierce between Zuri Island and Planka Point, from the high land in the vicinity of Sebenico.

In the channels of the Quarnero and at the entrance of this gulf, too much caution can not be observed. The bora here rushes down from the whole line of the Julian Alps with such irresistible fury that it is not only prejudicial to navigation, but extremely so to agriculture, which has in some parts been consequently abandoned. The chief part of the maritime trade of Fiume, so far as sailing vessels are concerned, can only be carried on during the fine season, and the otherwise eligible haven of Porto Re is almost useless on account of the bora. Whole districts are rendered uninhabitable, and, as not a bush nor a blade of grass can grow on the shores most exposed, local craft usually anchor off the parts where vegetation is most abundant. When Velebit Gebirge, the high mountain range of Croatia, is capped by white clouds, a sailing vessel should not venture into the Quarnero.

The bora sometimes obliges vessels anchored in Trieste Road to seek shelter under Salvore Point and along the coast of Istria. It

is the more dangerous in the channels amongst the islands because it generally takes vessels on the beam and there is but little room; the mariner should at all times keep under the weather island in order to be able to bear up.

It gives sufficient notice of its approach to an attentive observer to allow of precautions being taken. When small dark clouds are seen rising from the mountains of the eastern coast of the Adriatic and taking irregular directions, and large white, round, isolated clouds gather on the tops of the high mountains of Dalmatia, a bora may be shortly expected, and it will continue to blow until the former disappear and the latter no longer adhere to the land. As a general rule, the clouds only leave the sides of the mountains when the wind loses its force and is about to cease.

The barometer is no positive guide, though it generally falls slightly on the approach of a bora and at times corresponds with the violence of the coming wind, yet it generally rises during the gale. If to the fall of the mercury are added any of the indications above mentioned there should be no hesitation in taking every precaution that prudence may suggest.

The heaviest boras are at times announced some hours before they burst, by a dense black cloud on the northeastern horizon, with light fleecy clouds above it; a rather lurid sky, and an unusual stillness of the atmosphere. The general direction of these gales is from between north and northeast, and their ordinary continuance about 15 or 20 hours, with heavy squalls, thunder, lightning, and rain at intervals. The bora most to be feared is that which, after blowing in sudden gusts for three days, subsides, and then returns for three days longer.

It generally dispels any hovering clouds or fog, and when it blows with great force the weather is very clear, a few small round clouds moving rapidly being alone visible. If the atmosphere should not be cleared after 24 hours, the wind will probably continue a long time, or a southeaster will spring up. In winter it is frequently accompanied by thick fogs and snow, causing excessive cold, and is then most persistent, sometimes blowing for 9, 15, or even 30 days, with short intervals of calm, during which it is not prudent to make sail. It usually comes on at the rising or setting of the sun, abating, or frequently ceasing, at noon or daybreak; but should it continue in force at these times it may be expected to last a considerable time.

The bora often succeeds a slight fall of rain following a long drought; should it not blow in such a case, southeasterly winds may be expected.

In summer it is called the borino and it then seldom or never lasts longer than three days and is usually moderate; if it increases in

strength, it is generally for a short time only, and after a great deal of rain; it has, however, some difficulty in rising as long as the mountains of the eastern coast are wet with rain; if it then occurs, it is of short duration and the force is generally in proportion to the dryness of the land. March, the end of May, and especially the early part of June, seldom pass without a gale.

As examples of the extraordinary violence of these summer bora gales and squalls, it may be well to give two instances of actual experience as described by the commanding officer of the British naval vessel *Aid*, on surveying service. "A very hard summer bora, which I experienced in Lissa Harbor on July 13, 1819, occasioned a fall in the barometer from 30.15 inches to 29.77; it was precursored by the usual denseness near the horizon, with a fresh southeast wind, and during the preceding two nights—although the weather was fine—there was much lightning in a vast cloud bank which had formed. On the third evening this bank spread over the sky to the zenith, and the coruscations became incessant; whereupon, as we were lying at single anchor, prepared for going to sea, we dropped the best bower, braced yards to the wind, etc. In the midst of the aerial commotion, at about 1 in the morning, the gale suddenly chopped around from south-southeast to north-northeast with such fury as to make the ship heel over in an extraordinary degree, and the cables were veered out until she was uncomfortably close to the Marina. It was fortunate that we were in so excellent a port, for the sudden shift of wind must have been injurious to any vessel under sail, however well prepared. In about an hour the acme of its force somewhat abated, rain fell in large drops, and for two days afterwards we had cool breezes from the north and clear weather.

"Shortly afterwards we underwent another of these blasts, of which I particularly noted the advent, progress, and termination. On August 9, of the same year, while moored with the stream and small bower in the perfectly land-locked harbor of Lussin-Piccolo, the morning was suspiciously cloudy, although the preceding evening had been remarkably clear overhead . . . On the morning stated, the wind was in the southwest quarter, the clouds lurid, the atmosphere dark, and the whole celestial aspect so singular and threatening that notwithstanding our apparent security, I ordered the top-gallant and royal yards on deck, top-gallant masts to be struck, the best bower to be ranged, and the sheet cable bent. In the afternoon the horizon from northwest to north was as black as possible, and the gloominess of its appearance was contrasted by a bed of white fleecy clouds which rose immediately above it and soared rapidly till they joined a series of waved distinct streaks overhead forming an immense arch from west-southwest to east-northeast with a deep blue sky on each side. In a few minutes a strong wind

had evidently arisen in the northwest, as it blew the clouds right and left, though we still felt the southwester even stronger than in the morning.

"The scene was now awfully grand; masses of cloud were in motion from the zenith downward, excluding by degrees the brassy sky, while a momentary stillness was but a presage of the coming storm. At this time all the fishermen were making for the shore, and the whole Marina resounded with the shouts of people endeavoring to rouse up their vessels on the strand. At length large drops of rain plashed down and the whole atmosphere seemed to resolve itself into black smoke, while the north wind was seen approaching by the eddies of sand which it threw up before it. The gust now reached the ship, roaring tremendously, with such force that both our cables were snapped like twine, and before we could bring up with the best bower and sheet anchors, veer to 40 fathoms, and brace the yards by—which was effected with a celerity that delighted me—the ship was nearly thrown upon the quay. The rain now poured a deluge, and the apparent mill-pond of a harbor was soon covered with long, rolling waves, the crests of which were cut off in foam. Every boat in the port was either swamped or capsized; oars, rudders, and thwarts were floating on every side, and the vessels along the Marina were driven one upon the other. Such a gust, if it had continued, must have destroyed the place; but, providentially, its excess of violence lasted only a few minutes, and in less than an hour all was restored to comparative tranquillity. Among other disasters, we noticed the destruction of a small local craft astern of us; she had escaped the first blast with being merely thrown on the mud, but after she was aground, the rain falling on her cargo of unslacked lime occasioned her conflagration, and loss of sight to some of her crew. The mischief done on shore was much greater than that afloat; numbers of trees were torn up by the roots, the roofs of houses blew away like chaff, windows and doors were forced in, and even floors were displaced by the wind getting into the lower stories.

"The crew of two of our boats—the gig and cutter under the charge of the able master—which were capsized outside the harbor at the very commencement of the bora, though within a few feet of the land, were obliged to lie along the ground on gaining the shore, and grasp the brushwood while the main force passed over them; the masts, oars, sails, and arms of these boats were lost, together with some of the surveying instruments. In the morning the barometer stood at 30.05, and after the rain, at 29.91 inches; the bora, though a summer one, was pronounced to be the severest which had happened in the memory of the oldest inhabitant."

The Sirocco.—The southeasterly or sirocco winds are common throughout the Adriatic; they are usually steady and are only re-

puted dangerous on account of the heavy sea, thick fogs, and rain which accompany them; when they occur in winter the land is entirely concealed from view. They are frequently succeeded by a fresh northwesterly breeze.

The indications of an approaching sirocco are a very perceptible mildness of the atmosphere, even in winter, and dark clouds settling on the summit of the islands and lofty mountains of the eastern coast; these signs occur some time before the wind commences, and it then generally extends gradually over the whole sea. A swell from the eastward often precedes it, and at times lasts after the wind has ceased; this swell, and an increase in the strength of the regular current setting northwestward along the eastern coast, with a rise of the sea above its ordinary level, are sure signs of an approaching southeasterly wind.

Current on eastern coast.—From Saseno Island, northward of Cape Linguetta, the stream appears to divide into two parts, the in-shore branch taking a northerly direction as far as the Gulf of Drin with an irregular and often scarcely perceptible rate, but which, at times with southeasterly winds, amounts to 1 or $1\frac{1}{2}$ knots. This current follows great force. If after continuing some time the wind should die away and be succeeded by a calm, or by variables, and the signs above mentioned continue, a renewal may be soon expected.

The sirocco is more frequent in winter than in any other season, generally blowing alternately with the bora; between the two winds, there is nearly always an interval of light variable winds. It commonly lasts three days, and very seldom beyond nine days in winter. It comes on by degrees and only blows with violence after 36 or 40 hours' duration; as its direction is right up the Adriatic, the sea gradually increases, the clouds become heavier, rain falls in abundance, and the weather becomes very foggy, especially in October, November, December, and January.

Sailing vessels near and outside the islands of the eastern coast may be in danger, should the southeasterly wind subside immediately after blowing hard and leave a heavy sea, which often occurs in the evening. In this locality, shelter should be sought when clouds are seen gathering on the summits of the islands. The eastern coast between Ragusa and the Gulf of Drin is also dangerous, and especially so off the Gulf of Cattaro. On the whole of the western coast and along the Venetian shore, where no shelter whatever is found, the sea breaks heavily.

In summer, the southeasterly wind is never strong, and toward the middle of the Adriatic it generally alternates with light easterly or northwesterly breezes. In the season, should the clouds which collect on the summits of the islands, particularly Lissa, become de-

tached and rise in thick globular masses, a northwesterly wind may be expected to succeed.

When southeasterly winds die away in winter, spring, or autumn, they are generally followed quickly by those from west and northwest to north, which bring fine weather.

The siffanto.—Besides the bora and sirocco, which are the two principal winds in the Adriatic, the southwest or Siffanto, and southerly winds, prevail occasionally. The southwesterly wind is frequently violent but does not last long; it sometimes shifts suddenly to southeast; these sudden changes are very dangerous in the vicinity of the mouths of the Po, where they always occur in strong squalls, called *furiani*, with a heavy sea.

A southerly wind is often preceded by the same signs as a southeasterly wind and it also gives rise to a high sea. Southerly and southwesterly winds are but little felt among the islands, which afford protection from them; and, when they are light in the offing, calms are nearly always to be found within the islands. They do not last long and are generally succeeded by westerly and northwesterly breezes.

The maestro, or northwest wind, is of rather frequent occurrence in the Adriatic, but mostly during summer, on the western coast, and in the northern part of the sea; it is always followed by southeasterly winds. When it occurs on the eastern coast, it generally rises about midday, subsides toward evening, and is commonly succeeded by land or by variable winds, which, in fine weather, sometimes continue after sunrise.

In the fine season, a strong northwesterly wind occasionally succeeds a southeaster along the western coast, but it abates at night and during the morning, is generally followed by light land breezes.

Winds from northwest, north, and west do not raise much sea, and they always enable vessels to leave the Adriatic.

Local observations on the winds of the Adriatic.—At the entrance of the Adriatic the prevailing winds change with the seasons; being generally from south, southeast, and west, in autumn and winter; and, from northeast and north in spring and summer. The latter may last for some time, but very seldom more than three successive days. Westerly winds, though often blowing hard, with rain in winter, are not to be dreaded, as good shelter from them can be found. Easterly and northerly winds sweep over the mountains of Epirus, which in winter are covered with snow, causing intense cold. Those from the southward produce a suffocating heat, rendered still more disagreeable by rain and thick fogs.

Entrance.—The entrance of this sea is liable to very sudden gusts, and when it continues to blow hard the sea is short and confused, subsiding, however, with the wind.

Eastern shore.—On the eastern shore of the Adriatic, from the Gulf of Drin to the Gulf of Quarnero, the bora blows almost constantly in winter with considerable violence. Southeasterly winds, accompanied by thick fogs and rain, prevail on this shore during the autumn and often render impracticable any approach to the Gulf of Cattaro and the adjacent shores.

Land breezes of variable strength are common at night on the eastern shore during the whole year, and at the entrance of many ports continue for a long time after sunrise.

In the neighborhood of the Narenta, when the clouds, which generally cover the top of Mount Bukavac, rise and break, the bora may be confidently expected with hurricane strength; if these clouds are scattered in the sky, the bora is already blowing near the land, though it may not have reached the offing. Very intense cold is experienced in winter in this part of the Adriatic on the approach of the bora.

A curious phenomenon which occurs in the mountains of Montenegro may here be noted. In the most steady season of the year, in the finest day, and with the purest atmosphere, when not a speck of cloud is perceptible, thunder is heard among the mountains, and it is observed that at these times all the rivulets and springs in the neighborhood discharge a greater quantity of water than usual.

In the Gulf of Quarnero, the bora is the prevailing wind; there, more than at any other part of the eastern shore, it renders navigation very dangerous, and between Cape Promontore and Unie Island it gives rise to whirling gusts and a heavy sea. It sometimes blows furiously in the Morlacca Channel, along the Croatian coast, and as far as the middle of the gulf, while there is a dead calm at the islands at its entrance and in the offing. It is easy to know from the appearance of the Velebit Gebirge, the high mountain range of Croatia, whether the bora is blowing or about to blow in the Quarnero Gulf. When the summit of this range is covered with large whitish clouds and small dark clouds are seen to rise from the gorges, every possible precaution should at once be taken against a gale.

The bora, or Borino as it is then called, is less violent in summer; it abates chiefly at the entrance of the channels in the vicinity of the coast of Croatia, where it is followed by a light breeze from the eastward which blows until about 9 o'clock in the morning; then, after an interval of calm, the wind sets in from the northwestward until evening, and so on during nearly the whole of the fine season.

In the Gulf of Quarnero, the dark clouds which precede easterly winds gather first on the summit of Mount Ossero, at the northern end of Lussin Island, then on Maggiore and Velebit Mountains, after which they gradually cover the lesser heights. In the winter, the bora and the sirocco sometimes contest violently for the mastery

in this gulf; caution is therefore requisite in the navigation of these waters, and with southeasterly winds, even if blowing hard, any signs of the bora must be carefully watched.

The bora is almost constant in winter on the coast of Istria, where it sweeps along the shore. It is almost impracticable in a sailing vessel to take a harbor while it lasts, for on approaching land it is generally found to blow out of the inlets.

Southeasterly winds, in winter, become more southerly on reaching Cape Promontore, but close to the land, along the western coast of Istria, they will be found to draw eastward.

Southwesterly winds are dangerous on the latter coast, on which they blow and cause a heavy sea; although generally of short duration the land becomes obscured when it is difficult to take a harbor.

In summer, when the weather is fine, a light and variable breeze from northeast to east blows almost every morning, nearly throughout the Gulf of Trieste; it generally draws northwestward toward noon; then southward and so continues until evening. In this gulf, two opposite winds sometimes blow at the same time with equal force—the one northward of Salvore Point, the other between Cape Promontore and Rovigno; vessels should therefore always approach Salvore Point with great caution if the sky be not clear in the northeast, which is a sure sign that the bora is blowing in the northern part of the gulf.

Western shore.—In winter, on the western shore between Venice and Gargano Head, the prevailing winds are the bora and sirocco, which blow alternately; if they last for any length of time the sea rises and the navigation becomes dangerous, especially near the mouth of the Po.

In summer, on the coast, land and sea breezes prevail; they are generally light, and, close inshore, the land wind lasts during the night and until near midday; the sea breezes then sets in from the southward or southeastward until evening. On the Venetian shore the sea breeze usually comes on feebly and gradually, and sometimes springs up quite suddenly and accompanied by thick fogs at the head of the gulf; in such a case it is of short duration.

In spring the winds here are variable; in autumn they are almost always from the southeastward.

Southwesterly winds sometimes blow in violent squalls off Mounts Conero and Gargano. Off the coast between Gargano Head and Cape Sta. Maria di Leuca, the bora generally blows from the northward except in a very heavy gale; an offshore wind is frequent at night while the bora is still blowing in the offing.

Currents.—The following notes on the currents of the Adriatic have been published by the Italian Hydrographic Office:

Three kinds of currents have been observed in the Adriatic, namely, a regular inshore current, a tidal current with periodic variations, and a current produced by the action of the winds.

The influence of the rivers which flow into the Adriatic makes itself felt to a certain extent after the period of heaviest rain, but it is always local.

The inshore current enters the Adriatic to the north of Corfu, along the Albanian coast, and circulates round the Adriatic. Its approximate breadth is 20 to 30 miles along the eastern coast, about 10 miles in the northern part of the western coast, and about 6 miles in its southern part.

Off the Melada and Lagosta islands, a branch of the northwest-going current flows out in the direction of the Pelagosa islands and Capo Testa del Gargano, where it unites with the southeasterly current along the western coast, which it considerably increases in strength. Another rather weaker branch turns off opposite the Quarnero, and also flows towards the western coast, where it unites with the southeast-going stream.

The rate of the northwesterly current under ordinary conditions is three-tenths of a knot in the southern and half a knot in the northern part.

The inshore current can not be directly observed along the greater part of the eastern coast, because, under the influence of the tides, it alternates between a northwest and southeast direction, and is not noticeable except by the extent to which vessels feel its influence during a rising and falling tide.

The tidal currents, under ordinary conditions, alternate regularly twice in a day. These currents are hardly felt in the southern portion of the Adriatic, but toward the north they increase with the rise of the tide, and attain a rate of half a knot. From the above it is obvious that a flood tide coming from the south strengthens the northwesterly current and weakens the southeasterly current on the eastern coast. Inversely, an ebb stream weakens the northwest-going current and strengthens the southeast going. Under ordinary conditions, therefore, there are two currents on the eastern coast, the stronger flowing to the northwest, alternated by a weaker flowing to the southeast, both of which might at first sight be mistaken for tidal currents since they change with the tide, but which are in reality the result of the combined action of the inshore and tidal currents. The southeastern current of the eastern coast does not usually alter its direction, and the winds do no more than alter its rate. For the ordinary purposes of navigation, it is sufficient to regard these alternating currents as tidal streams, taking into account the influence produced by the inshore current.

The secondary current, which flows from Lagosta Island toward Capo Testa del Gargano, has a variable rate of one to $1\frac{1}{2}$ knots, and from recent observations it does not appear that this current is varied in its direction by the action of either tide or wind.

The currents produced by strong and persistent winds can influence the inshore and tidal currents so as to interfere with the regular change on the eastern and to completely reverse the southeast-going stream on the western coast. Strong winds blowing in the direction of the currents greatly increase their velocity, the greatest rate being attained on the eastern shore with south-easterly winds and a rising tide, and on the western with a strong northwesterly wind and a falling tide. Under these circumstances the current will attain the rate of 3 knots.

On the eastern shore, ships may be driven 7 to 12 miles to the north-west during a day under ordinary conditions and 24 to 30 miles in a day during persistent southeasterly winds.

Entrance.—The currents are very variable and frequently strong toward the middle of the entrance, where in fresh northerly breezes they set from west-northwest to west-southwest at the rate of from $\frac{1}{4}$ to 1 knot an hour. Along the western coast, between Capes Otranto and Santa Maria di Leuca, the current is generally strong except in calm weather and during the fine season, when the wind blows directly on this coast. In a calm, at 6 miles from the land, the current sets about southward at the rate of 1 knot, and near Cape Santa Maria di Leuca at more than 2 knots. In fresh northwesterly winds, it soon attains a strength of 2, 3, and even 4 knots.

The westerly direction of the current at the entrance of the Adriatic may be considered almost constant; at times, however, under the influence of westerly and southwesterly winds, along the Ionian Islands and as far as Cape Linguetta there is an easterly set of about 1 knot an hour, and even more between the islets northwestward of Corfu, where, in December, it has been found running north-northeast at the rate of 2 knots, with a smooth sea and a light southwesterly wind.

The barometer always falls with a southeasterly wind, and generally with all winds from the southward; when it continues to fall with the indications described, a southeasterly wind may be expected to blow rather regularly with the coast as far as Cape Rodoni, its greatest velocity being near the headlands; but in the bays it appears to be diffused. Beyond the Gulf of Drin it again follows the direction of the coast.

The other branch from Saseno Island runs generally in the direction of Meleda Island, at a rate varying in calm weather from $\frac{1}{2}$ knot to 2 knots. When influenced by southwesterly winds, and even in calms, this current frequently sets northeastward about $\frac{3}{4}$ knot an

hour. Between Cape Linguetta and Meleda Island a southerly direction in the current is rarely found; this is only met with westward of this line and it increases in force as the coast of Italy is approached, especially with a northerly breeze.

Off the Gulf of Cattaro, the inshore current of the Albanian coast is deflected by an outset caused by southeasterly winds, which drive the water toward the coast; the two streams here produce eddies which may affect a sailing vessel if becalmed.

Beyond Cattaro the general current resumes its course, and off Ragusa, being obstructed by the numerous islands to the northward, it sets chiefly west-northwest or west.

Inner channels.—Among the islands the stream is generally westerly, in the direction of their length, and is more regular in the larger channel than in the others. The rate varies according to the wind and state of the tide, which latter is considerably felt here and on the coast abreast; with southeasterly winds it sometimes attains a rate of $3\frac{1}{2}$ or 4 knots, especially at the eastern entrances. In the narrow channels it is more rapid and variable, in consequence of the water within them with difficulty finding its level, at flood and ebb, outside the entrances.

In the Narenta Channel, the current sets westward, acquiring great strength in easterly winds and when the waters of the river are swollen; when these winds fall light, the stream is observed to advance along the Sabbioncello Peninsula, leaving a counter current favorable to the navigation of the channel along the island of Lesina.

In the Meleda Channel, with the wind blowing hard from the southeastward, the current runs west-northwest at the rate of from 3 to 4 knots.

In the Curzola and Sabbioncello Channels, the westerly set is tolerably regular, but southeasterly winds accelerate it, especially in the latter, which then becomes almost impracticable to sailing vessels from the westward.

The current in fine weather follows the general direction of the Brazza Channel. Irregularities are produced by the offsets of the Narenta and the Cetina, but they are of short duration.

In the Solta Channel the stream sets around and upon the Zirona Islands.

In the small channel of Spalato it is variable in force and direction.

Outside the islands Lagosta, Lissa, etc., there is a regular westerly current, but on closing them it becomes uncertain. About Lissa the set is nearly always westerly; with continuous southeasterly winds it runs with considerable strength, particularly toward

the western part of the island, from whence it strikes off in a north-westerly direction, causing an eddy, which renders this passage somewhat dangerous. The westerly current in this part of the Adriatic is accelerated by the outset from the channels of the various islands.

In light winds and calms the westerly set is at the rate of about $\frac{1}{2}$ knot an hour between Pelagosa and St. Andrea Islets, but with fresh northwesterly winds, its force proportionally decreases.

Near St. Andrea and Pelagosa Islets, the current, especially in winter, has no regular direction, but produces somewhat dangerous eddies; under the influence of a strong bora in the Gulf of Quarnero, it then frequently sets south-southwest or south, turning more westward as it progresses southward. Well out in the offing at such times, near Pomo Islet and between Lissa and Premuda, very irregular streams prevail; the neighborhood of these islets should, therefore, be avoided. After passing Lissa and St. Andrea, the current apparently takes its former direction parallel with the islands and coast.

About Planka Point, the current is always rapid and variable, and, with southeasterly winds, strong eddies are produced. From this point, and among all the islands northwestward of it, the tide is considerably felt and contributes greatly to the irregularity of the current. At 10 miles seaward of these islands, its general direction is northward, the rate decreasing gradually from $\frac{3}{4}$ to less than $\frac{1}{2}$ knot between Grossa Island and Cape Promontore, and in a strong bora it entirely ceases.

Off Premuda Island, a branch of the northwesterly current flows southwestward toward Ancona and joins the southeasterly stream along the Italian coast.

Between Planka Point and Zuri Island, the current resumes its regularity and northwesterly direction, modified only by strong northerly winds and the set of the sea. Between Zuri Island and the Quarnero it runs generally in the direction of the islands, but, in the narrow channels, the water is in a constant state of agitation, and the numerous rocks and islets in them destroy all regularity of flow.

Inner channels.—In the four passages between Zuri and Zlarin Islands, and in the vicinity of Sebenico, the set is almost always in an oblique direction, and frequently with a velocity of 3 or 4 knots, which demands great attention. Amongst the extensive cluster of islands and rocks southeastward of Inconorata Island it is also rapid.

At the eastern entrance of Mezzo Channel and in the vicinity of the Tre Sorelle Islets, the current runs with considerable strength; it is regular in fine but very variable in rough weather.

In Pasman Strait, it is liable to great irregularity caused by the rocks and islets; strong winds give the stream a motion inclining across the eastern entrance of that channel, and it then acquires a rate of from 3 to 4 knots.

In the Zara Channel, it sets northwestward with some regularity and with a velocity at times of from 3 to 4 knots.

Gulf of Quarnero.—In this gulf and in the channels of the Dalmatian Coast, the currents are irregular, varying in rate and direction according to wind and tide; they are also influenced by the rivers and numerous islands. Gales from the offing throw a large body of water into these channels, where it is pent up until the wind abates and then runs back with rapidity; if, on the contrary, the winds are from the northward for any length of time, the water is driven into the offing and as soon as the wind moderates returns with force.

In the Great Quarnero Channel, with northerly winds, and during the whole continuance of the flood tide, a counter current will be found setting northward along Cherso Island. In proceeding to Fiume it is therefore preferable to keep that island aboard instead of the Istrian Coast until in the Farasina Channel. With the same winds, the southerly current at times attains a velocity of 4 knots, and in a sailing vessel is almost insurmountable.

During a heavy bora a stream sets southwestward along the coast of Istria and out of the Quarnero Channel at about 1 knot an hour; it runs more slowly as Premuda Island is neared and takes a southwesterly direction; in approaching St. Andrea Islet, it sets south-southwest and south, gradually turning more westerly. During a calm night a set of 25 to 30 miles out of the channels of these islands has been experienced.

On the Istrian Coast.—About Cape Promontore and the rocks which surround it, the currents are strong and variable. Under the influence of the bora they set west or west-northwest more than 1 knot an hour and their effect is felt as far as Pola. Caution is therefore necessary when in the vicinity of this as well as all other projecting points on the eastern coast.

In ordinary weather, beyond Cape Promontore and as far as Trieste, the stream sets slowly along the coast of Istria, strongest at Auro Point, at the Marmi Grande and shoals in the vicinity of Port Orsera, and at Salvore Point, but its breadth does not generally exceed 2 or 3 miles. With northwesterly winds there is a strong set toward the Brioni Islands.

Gulfs of Trieste and Venice.—Between Salvore Point and Trieste, the current turns eastward and is always felt at the latter place where it sweeps round the bay on its course to the Venetian shore at a velocity of about 1 knot an hour, decreasing in the offing.

In the Gulf of Trieste, in fine weather, the currents are regular and their direction always southerly. At a short distance off the coast of Istria the motion of the waters is in general southwestward or toward the Venetian shores, and is tolerably regular in fine weather, but is greatly influenced by wind and tide. This irregularity is much more perceptible on the eastern than on the western coast.

During the fine season there is scarcely any current in the middle of the gulf.

The inshore current, from the head of the Gulf of Trieste, always sets slowly about west, following the various sinuosities of the coast. It is hardly perceptible during calms in summer or during southwesterly winds, but under the influence of the bora it probably runs about 1 knot an hour.

The tides, which are very perceptible on this coast, and the rivers which empty themselves into the sea between the Tagliamento and Maestra Point, have the effect of diverting the current from its usual course; the rivers also bring down quantities of mud and sand which alter the shape and direction of the banks along the coast and effect the set of the stream. At Venice, especially, the sea flows rapidly into the channels and harbors of the lagoons; in receding, the streams in strong sea wind give rise to wide and dangerous eddies.

The general direction of the southerly current is never destroyed, though it may be influenced by wind or other causes, and its permanence is proved by the direction and form given to the banks at the entrance of harbors and mouths of rivers.

Current on western shore.—From the delta of the Po the streams spread out eastward and then bend southward and south-eastward; in spring, on the melting of the snow and after abundant autumnal rains, the action of the freshets is most perceptible.

From Maestra Point, the current of the western coast of the Adriatic takes its general direction southeastward. As far as Ancona, it is subject to the deflection caused by the offset from the numerous streams and rivers; its rate is never considerable, seldom exceeding 1 knot an hour even after the great freshets of the Po, when the sea, to a distance of 8 or 10 miles in the offing, is discolored by the mud brought down.

In the vicinity of Ancona, and principally southward of that port, the current, deflected by the projection from Mount Conero, sets eastward, frequently at the rate of 1 knot; but, with continuous winds from between northwest and northeast, the rate exceeds 2 knots, and the stream may then be dangerous to vessels approaching the land for Ancona, as it sets on the San Clemente Rocks. In the neighborhood of Ancona the regular current of the Italian coast acquires great strength.

Between Mounts Conero and Gargano Head, the current continues its course following the Abruzzo coast; its rate is estimated at 1 knot an hour in fine weather, but it is more rapid near the shore of Mount Gargano. Here the coast causes a portion of the current to branch off eastward, while the other part sweeps round the head close along shore and flows across the entrance of the Gulf of Manfredonia without entering it. The branch setting eastward flows toward Pianosa and Pelagost Islets, and, meeting the western stream already mentioned, produces rapid eddies. Around and among the Tremiti Group, the easterly current is of great strength.

From Gargano Head to Otranto, the inshore stream having resumed its southeasterly direction, attains its greatest rate, which is estimated at $1\frac{1}{2}$ knots between Gargano head and Brindisi and nearly $1\frac{3}{4}$ knots between the latter and Otranto; with northerly winds, this rate rapidly increases and sometimes exceeds 3 knots. It is generally weak in summer, especially with on-shore winds, but with north-westerly winds its strength is sufficient to require attention.

After passing Cape Otranto, the current follows the trend of the coast southward and flows close round Cape Santa Maria di Leuca into the Mediterranean.

The offshore currents on the Italian coast are variable in their strength and direction according to prevailing winds. Bora winds drive the water toward the Italian, and southwesterly winds toward the Dalmatian coast; while southeasterly winds cause an irregular curve on either side. After a strong wind has lasted two or three days, a current contrary to that previously running will always be found as soon as the wind abates and will continue until the former has resumed its usual course.

About midway between Cape Promontore and Mount Conero the set varies between south-southwest and southeast at a rate generally of from $\frac{1}{4}$ to $\frac{1}{2}$ knot an hour. There is little or no current during the fine season.

Tides.—The tides of the Adriatic, like those of the Mediterranean generally, are very slight and irregular, but an approximate knowledge of the rise of the tide and of the time of high and low water, may often be of use; and attention should always be paid to the various causes likely to produce irregularities in the tide of any harbor visited. At the mouths of the rivers, especially of the Po, when the waters are swollen by rains or the melting of snow, the rapid outset necessarily retards the flood stream and accelerates the ebb stream. The land should therefore be approached with caution at such times, and, if necessary, the advice of local pilots obtained.

The tidal action is scarcely perceptible at the mouth of the Adriatic; it is first felt at Cattaro on the eastern and at Brindisi on

the western coast, becoming stronger toward the northern part of the gulf.

On the shores of Dalmatia the tides are weak and irregular; observations show a slight range of tide in calm weather, but none with fresh northwesterly winds.

In strong southeasterly winds, there is sometimes a rise of from 1 foot to nearly 2 feet, and in the channels and narrow passages between the islands, a rapid tidal stream of short duration is produced.

The tidal stream off the coast of Istria has been found to set against northeasterly winds at the rate of nearly 1 mile an hour and then return to its southeasterly course, and at times the effect of the ebb stream causes an apparent stillness of the offing and central waters.

On the western shore, the rise varies from 1 foot to nearly 4 feet at springs and according to local circumstances and prevailing winds. Bora gales cause a rise along the coast of Italy; at Barletta, Bari, Monopoli, and Brindisi, a tidal action is said to range from a few inches to 3 feet.

At Venice, with a heavy southeasterly gale, the sea sometimes rises 6 feet above the general level; these gales render the lagoons unapproachable and the channels unsafe; northerly winds cause a fall sufficient to uncover the mud of the lagoon.

A mean of five years' observations at Venice, according to Prof. Toaldo, gives a rise and fall of 2 feet at springs; also the approximate establishments of the ports of Malamocco and Chioggia at 10h. 30m.; and of Venice at 11h. 15m.

In the Ionian Sea and on the coast of the Peleponnesus (Morea), the tidal action is quite unimportant except at the entrance to the gulfs of Arta and Corinth, where both flood and ebb streams at times attain a velocity of 3 knots.

Navigation of the Adriatic.—These remarks apply chiefly to sailing vessels, as steamers will, in most cases, take the direct route.

In the navigation of the Adriatic, as with other narrow seas, local knowledge and experience are of great value. In winter, the chief difficulties arise from the frequency of thick fogs and boisterous winds, from the narrowness of the sea, and on the western coast from the want of shelter in bad weather. As a general rule, the eastern side is to be preferred, both in passing up and down the Adriatic, notwithstanding the disadvantage of adverse currents in the latter case. Under favorable circumstances in the summer season, well-found vessels sailing southward may venture along the western side. Here, however, in uncertain weather, a sailing vessel can seldom reckon upon reaching shelter from a sudden gale, and great risk is incurred if surprised by one in the vicinity of the shore; whereas, on

the opposite shore, there are nearly everywhere good ports or places of shelter, especially from the Bora.

In a sailing vessel the greatest possible vigilance is necessary to avoid being caught unprepared by a Bora; and at the slightest premonitory symptoms, no time should be lost in seeking the nearest place of refuge, as the violence of the gale may drive a vessel westward and reduce her to the necessity of anchoring on the open Italian coast with bad holding ground, unless she can reach the anchorage at the Tremiti Islands, or that in the Gulf of Manfredonia southwestward of Gargano Head, either of which afford good shelter to a vessel so overtaken.

The navigator should be on his guard also against the sirocco or southeasterly wind, which, when violent, is dangerous in some parts of the Adriatic; but, as it generally gives ample warning and invariably comes on gradually, there is usually sufficient time to secure shelter under the islands.

Making the land.—It is customary for vessels bound to the Adriatic from the Mediterranean, to endeavor to make Corfu Island, which, being high, is visible at a considerable distance. Approaching from the westward, the mountains of Epirus are first seen, then Corfu and its islands, forming a long chain of small regular hills. The monastery crowning Mount San Salvador, at the northern part of Corfu, is a good mark. The island may be boldly approached and a course steered westward of Fano Islands for Cape Linguetta, the eastern point of entrance to the Adriatic.

Sometimes Cape Santa Maria di Leuca is sighted, but occasionally the landfall is farther westward on the Italian coast. Cape Santa Maria di Leuca is easily recognized, being 520 feet high and projecting southeastward; when viewed from the southward, it presents a steep rocky face, precipitous at its foot; seen from the southwestward and westward, it terminates seaward in a slope of about 45° ; when approached from the southeastward and eastward, the slope is more gradual. On its summit are a chapel, a white signal tower, several houses, and, near the extremities of the cape, a white lighthouse.

In making the land with southeasterly winds, which usually bring thick weather, it is difficult to distinguish the coast of Italy even at a short distance; it is then best not to make the land westward of Cape Santa Maria di Leuca, as the shore should not be closed on account of the foul ground westward of Pali Point. If the Italian coast is sighted, every effort should afterwards be made to close Cape Linguetta and the Albanian coast, especially in the bad season.

The chances of favorable or unfavorable winds on entering the Adriatic depend on the time of year; thus, in the autumn and winter, southerly, southeasterly, and easterly winds prevail; in summer the

most common winds are northeasterly and northerly; the latter last a considerable time, but are never strong for more than three days.

On making the land with fair winds, viz, winds between southeast and southwest, a course should be steered to pass about 12 miles from Cape Otranto. In the winter, with strong winds, a heavy sea and rain are almost continuous at the entrance of the Adriatic; nevertheless, there should be no hesitation in proceeding, after having verified the vessel's position, as shelter may be easily found if it should become necessary.

With contrary winds the Albanian coast should be closed to take advantage of the weatherly current, which, setting northwestward, is favorable on that coast. For a similar reason the Italian coast, between Capes Santa Maria di Leuca and Otranto, should then be avoided as much as possible, for with such winds the southeasterly current is always rapid there.

At the mouth of the Adriatic in the fine season northwesterly winds are often rather fresh during the day, and vessels, if unable to beat against the current which constantly sets out near the middle of the entrance, proceed to the anchorage of Port Castro. With a violent bora it is not prudent to attempt to enter the Adriatic in a sailing vessel; a vessel should then anchor under Cape Santa Maria di Leuca until the gale is over.

The Albanian coast, between Corfu and Cape Linguetta, along which a vessel should work up against contrary winds, is high and bold, offering no shelter or good anchorage; therefore, it should not be closed with too freely during winds which make it a dead lee shore, although the current would probably be favorable.

When proceeding to the Gulf of Drin, Cattaro, Ragusa, etc., after passing Cape Linguetta, no remarkable point presents itself along the generally low sandy coast of Albania, except Cape Laghi, the high land immediately northward of Durazzo, and that of Cape Rodoni. Care should therefore be taken to keep a good offing. During the first part of the course the current sets northwestward about 1 knot an hour and northeastward when about abreast of Durazzo.

If overtaken by a heavy gale from the southward or southwestward, which is sometimes attended with danger on this part of the eastern coast, shelter may be sought in Valona or Durazzo Bays. The first of these is the easier of access under all circumstances; it is sometimes imprudent to run for Durazzo Bay in a southerly gale, as the adjoining land is low and not easily distinguished in thick weather. If unable to fetch Valona Bay, it is advisable to make for Rodoni Roads, where there is good shelter eastward of the cape. In Antivari Roads shelter may be found on the northern side of Volovica Point, which forms its southwestern extremity.

The most dangerous winds between Cape Linguetta and Cattaro are the bora, which blows from between northeast and east-northeast; southwesterly winds are right on the shore; and, with reference to making the land, southeasterly winds are usually accompanied by thick weather.

When between Cape Linguetta and Cattaro, if the warnings of an approaching bora gale, as described in the preceding pages, should be perceived, a vessel, if sufficiently far northeastward, should haul close to the wind on the port tack and seek shelter under the Albanian coast in the indentation of the shore between Antivari and Cape Dulcigno, or along the shore between the latter and San Giovanni di Medua in the Gulf of Drin, or, finally, in Lales Bay, southeastward of Cape Rodoni. If far enough northward and sufficiently near the shore, with the bora not too violent, a vessel of light draft, by immediately standing on the starboard tack, might reach shelter in Molonta or in Traste Bay; or if of considerable draft, in the Calamotta Channel. Lastly, if too far southward to reach either of these places, she should endeavor to fetch the anchorage at Meleda, in order to avoid the necessity of running to leeward; but it should be recollected that it is difficult to fetch into any of these anchorages when once this wind acquires more than moderate strength. In all cases great caution must be used in navigating the Dalmatian coast.

Cattaro.—On approaching the high lands of this gulf the bora at times reaches the vessel with such violence and raises so heavy a sea that attempts to fetch a port would be fruitless, and the most prudent course for a sailing vessel is either to scud under bare poles for shelter in the Gulf of Macedonia or to endeavor to quit the Adriatic for the anchorage of Santa Maria di Leuca. Sometimes when driven from under the land by the violence of the bora, the wind is moderate at a distance of 10 miles from the coast, but even then it is advisable to seek shelter elsewhere, as there is no probability of making out the land.

Ragusa.—With southeasterly winds a sailing vessel should not close the land in this neighborhood early in the day, as morning calms and current eddies may probably render her unmanageable. Ragusa is not a safe anchorage in a strong southeaster.

Breno Bay, northward of Ragusa Vecchia, affords good shelter for vessels of any draft either in a bora or with southeasterly winds, and is consequently a good place of refuge.

Calamotta Channel.—The caution given with regard to approaching Ragusa, is applicable to vessels entering this channel from the eastward; it is generally advantageous to make Ragusa in the first place as the current sets westward along the land. When arriving from the southeastward, the easiest and most frequented passage is that between the Pettini Rocks and Calamotta Island.

Islands, etc., southeastward of Planka Point.—The channels formed by this group are, generally, tolerably wide and less obstructed by rocks and shoals than those formed by the islands northwestward of Planka Point. In ordinary weather the currents are regular and the navigation simple. The precaution chiefly to be observed is, to keep as much as possible on the weather side of the channel with reference to the direction of bora gales and, therefore, with a port under the lee in the event of one rising suddenly. This caution is applicable to all passages on the eastern coast of the Adriatic.

On approaching the islands, Mount Timor, 2,954 feet high, serves well to indicate the position of the entrance to the Meleda Channel which commences off the western extremity of the Calamotta Channel and is chiefly used by coasting vessels. In the winter season, strong currents set westward and with southeasterly and southerly winds the shore of Meleda Island should be closed to avoid the rough sea under the Sabbioncello Peninsula; it is important not to be becalmed near the shore of the latter during these winds which often die away toward the evening leaving a considerable swell. With the bora, on the contrary, the coast of this peninsula should be hugged.

When the group is made from the southward or southeastward, Cazza and Lagosta Islands, the farthest from the mainland, are visible at a considerable distance and both are well lighted by night. Mount Hom, 1,237 feet high, at the western extremity of Curzola, will next be seen; then Mount Kom on the same island, 1,673 feet high, and remarkable for the various shapes its summit assumes; and subsequently the highest part of Lagosta with its chapel; but, the most conspicuous object, from whatever quarter the islands may be approached, is Mount Vipera on the mainland, 3,170 feet in height. Giuliana Valley, a remarkable break in the high land of the Sabbioncello Peninsula, is the best guide to the western entrance of the Meleda Channel, and for the passage between Meleda and Lagostini Islands.

On approaching the islands from the northwestward or westward it is customary to make Planka Point, which is easily recognized when arriving from the Italian coast. Of the islands, Pomo and San Andrea Islets are first seen, then Mount Hum of Lissa, Lissa Island itself, and the two Zirona Islands.

Cazza and Lagosta Channel.—If bound to Lesina, Brazza, or other channels from the southward, the passage between Cazza and Lagosta Islands should be taken, or both islands should be left on the starboard hand and a course shaped for the western extremity of Lesina; this point is easily distinguished by the forts which crown the heights surrounding the town, and by Mount San Nicolo with its fort.

Lagosta Channel is only used when bound through the Meleda Channel, or on quitting the latter from the eastward. After long continued southeasterly winds, the currents are troublesome at the western entrance and southerly winds cause a heavy sea; these winds frequently die away in the evening, leaving a heavy swell; therefore a sailing vessel must be careful to avoid the vicinity of outlying islets and dangers.

Sabbioncello Channel is used by coasting vessels from the southward in order to keep near the shore; they generally pass on the northern side of Torcola Island, especially if the weather should appear threatening, in order to keep Porto Grande under their lee. If unable to reach this anchorage in a violent Bora, it is best to make for port Lesina.

Neither the Greco de Lesina nor Narenta Channels have hitherto been much used in the ordinary course of navigation; the improvement of the port of Narenta and the great increase of trade there is, however, causing them to be much more used than formerly. They are also frequented by coasters passing to Makarska on the mainland, or by vessels driven there by stress of weather. It should be borne in mind that after easterly winds the current generally sets eastward under Lesina Island and assists a vessel when bound to the mainland. With these winds it is advisable to give a wide berth to the Sabbioncello Peninsula, along which there is no good anchorage in case of emergency.

Spalato Passage.—Vessels bound to Spalato generally pass through this small channel. On arriving from the southward, if the wind and current are unfavorable, a vessel may proceed to Port Milna of Brazza Island, if far enough northward; otherwise, in order not to lose ground, to Lesina, or if she be of light draft, to St. Giuseppe of Brazza.

Brazza Channel. Between the island and the mainland, like all others near the coast, is exposed to most violent Bora gales. The native mariners anchor every night under the mainland, and, when under way, keep near it, so that when unable to pick up an anchorage off it they may be in a position to fetch one in Brazza Island.

Zirona and Solta Channels.—These small channels are seldom used; in the former a very strong current always sets on the shore; if a vessel from the westward, after passing Planka Point, should take it with a fair wind on her way to Brazza Channel, the Macina Shoal in the western part of Spalato Channel should be carefully avoided.

In the event of threatening weather from southerly winds in the neighborhood of Meleda, and not wishing to enter a port, there is anchorage in the Meleda Channel off Port Mezza Meleda in about 35 fathoms, sandy bottom, at $1\frac{1}{2}$ miles from the shore. But it is necessary to be prepared to weigh when the wind slackens, in anticipa-

tion of a Bora. Shelter may also be sought in one of the ports southward of Curzola.

A sailing vessel from the eastward overtaken by a Bora and unable to fetch the islands should reach in on the port tack for anchorage on the Albanian Coast. If signs of this wind are perceived when in the neighborhood of Narenta or of Makarska, the coast should be closed and anchorage sought for as speedily as possible; but if surprised by it, it is advisable to run for shelter at once to one of the ports eastward of Brazza. If overtaken at a few miles from the Zirona Island, the best plan is to haul close to the wind on the port tack and endeavor to fetch the Lesina Channel. In the vent of the wind drawing ahead, as often occurs here, San Giorgio of Lissa should, if possible, be reached; or, if the vessel is too far to leeward, she might fetch Comisa Bay at the western end of Lissa.

In the vicinity of Planka Point, the bora varies between north and east, and on approaching the shore would probably be found to blow in such violent squalls as to render it impossible to carry any sail. If a bora is encountered in the Spalato Channel, and it is found impracticable to reach an anchorage in the Canale Castelli, it might be convenient to anchor under Brazza Island.

Route to the northward.—When proceeding to any of the northern ports and having arrived off Cape Linguetta a course should be steered for Lagosta, on the southern extremity of which island is a powerful light, visible 25 miles, which is a good point of departure. Having passed Lagosta, a course should be shaped for Cazza Islet, also well lighted, and from thence to pass southward of Busi Islet, or between it and Lissa; in the latter case, guard against the current which there sets strongly westward. The islands off Planka Point are frequently obscured by mist during southeasterly or southwesterly winds.

This is the safest and most prudent route at all seasons; but vessels bound to Ancona in summer at times sight Pelagosa Islet, which stands up like a column and shows from its summit a powerful light, visible when fine from a distance of 26 miles, which in clear weather can scarcely be passed on either side without being seen. Pelagosa Islet is 28 miles northward of the shore of Gargano Head. Following this course it is better to pass between Pelagosa and Lagosta rather than between the former and Gargano Head; for, although at this time of the year the currents are usually weak, when southward of Pelagosa and after heavy rains they may be found strong.

In the vicinity of Ancona the southeasterly set is sometimes so strong that in light winds near the highlands sailing vessels frequently find difficulty in reaching this port, especially if they have not made the land well to the northward.

After reaching Lissa vessels bound to Trieste or Venice usually shape a course to pass southward of the islands of Incoronata, Grossa, etc., sighting the light on Bianche Point, the northwestern extremity of Grossa Island, and from thence continuing for Cape Promontore.

Between Lissa and Cape Promontore, it is well to keep rather close to the islands in order to profit by the ordinary northwesterly current, and to keep in a position to reach one of the numerous sheltered localities in the event of a bora gale rising. Among these the chief are: Port San Giorgio of Lissa, on the northern side of the island; Port Tajer, the open anchorage on the southwestern side of Grossa, where a vessel may ride out a heavy gale; the open anchorage under Premuda; Port Lussin Piccolo; Port San Pietro di Nembo, for small vessels; and the excellent anchorage of Unie Channel, which has sufficient space for a fleet.

When abreast of the Great Quarnero Channel, be as near as possible to its entrance so as to be in a position to make at once for an anchorage on the occurrence of a bora, the violence of which wind from this gulf is such that a vessel is sometimes unable to carry any sail, and that when the Italian coast is not a very distant lee shore. With the wind between southeast and southwest, a heavy sea sets on the coasts of the islands between Planka Point and Cape Promontore, and as the wind frequently lulls toward evening the appearance of the weather should be carefully watched so as not to be caught too close to the shore. Besides other warning symptoms, gales from the southern quarter are preceded by a long swell from the southeastward; in the winter season this swell continues some time after a southeasterly wind has been succeeded by a bora gale.

The most remarkable object first seen after passing Grossa Island, is Mount Ossero, in the form of a cone 1,909 feet high, at the northern end of Lussin Island. When farther northward, the forked summit of Monte Maggiore, 4,575 feet above the sea, and the highest mountain of Istria, is seen. During sea breezes, especially from the southeastward, or when they may be expected, the summits of the two mountains are always clouded; during land winds and at the cessation of sea winds they suddenly become clear.

Cape Promontore is dangerous in thick weather, being low and bordered by shoals; having sighted it, or at night the light on Porer Rock, 1 mile southwestward of the western extremity of the cape, the vessel should be kept at least 3 miles southward of it until the Albanese or Sunk Rock has been passed, especially in light winds and smooth water, as the current is then strong and sets with eddies in the direction of the shoals.

Islands, etc., between Planka Point and Cape Promontore.—The channels formed by these islands are frequented by small craft,

but their navigation is difficult and requires the greatest care, as they are narrow and have numerous rocks and shoals. The Bora blows across them, and the currents are rapid and changeable. Vessels of considerable draft proceeding northward should keep outside the islands, unless bound to Zara or to Sebenico.

Zara and Sebenico.—When bound to either of these ports, after Planka Point has been sighted, the islets abreast of Rogosnizza and Capocesto should be left on the starboard hand and a course shaped for Zlarin Island.

The Bora occasionally descends from the mountain valleys in the neighborhood of Sebenico with such violence that even when close under the land it is not practicable to reach any anchorage on the coast, and it becomes necessary to run for Lissa or Lesina. Southeasterly winds are sometimes troublesome between Planka Point and Sebenico, but, except in thick weather, shelter from these can always be reached.

When bound to Sebenico or to Vodice, the coast should be closed as much as possible, and, having passed the islets off Capocesto, a course should be shaped for one of the inshore passages before alluded to.

In proceeding to Zara from Planka Point there are four passages; of these the best and most used is the Zlarin Channel, between Zmajan and Zlarin Islands. It is the most weatherly, and, by taking it, a vessel is enabled to reach Pasman Strait with ease and also to anchor securely in a bora gale. In steering from the southeastward for Zara through Pasman Strait, the vessel's draft of water has to be considered. The next best passage is the Zuri Channel, between Zuri and Kakan Islands, though here the current is rapid and variable.

Pasman Strait, if taken on the way to Zara, should not be attempted without a commanding breeze, especially in a large vessel, as the current often sets toward the shore at a velocity of 3 knots.

Ancona to Zara.—Vessels bound from Ancona to Zara, between Grossa and Melada Islands, make the light on Bianche Point, the northwestern extremity of Grossa Island, which marks the southern side of entrance to the passage. When nearing the entrance, a good berth should be given to the Bacili Islets and a course steered for Golac Islet which should be left a little on the starboard hand, and then between Ton Mali Island on the port hand and Tun Veliki on the starboard. Having passed through, steer to round the northwestern point of Uglian Island, and from thence for Port Zara. If a Bora gale should suddenly arise, recourse may be had to the anchorage of Tre Sorelle on the eastern side of Sestrun Island.

If it is intended to enter the Mezzo Channel after rounding Golac Islet the chart is the best guide.

Gulf of Quarnero.—As previously explained, the currents are more affected by the tidal wave in the Gulf of Quarnero and among its numerous islands, than elsewhere, owing to the narrowness of egress for its waters; at times, a sailing vessel can scarcely stem them without a fresh fair breeze. The bora also is a source of danger, but on the whole and with proper care, the navigation of the Quarnero is not difficult and is very important, owing to the growing commerce of Fiume, and to that of Porto Re, Segna, Nona, Zara, and the islands.

There are two passages to the Quarnero Channels for vessels of deep draft—the Great Quarnero or main channel between the coast of Istria and Cherso Island, which leads direct by the Farasina Channel to the Gulf of Fiume; and the Quarnerolo Channel, which communicates with all the other channels inside the islands and has its entrance between Asinello and Premuda Islands.

Great Quarnero Channel.—Vessels from the westward usually take the main passage which is well marked by numerous lights. With a flood tide and fair wind, the eastern side of the passage is to be preferred, as the current there sets northward during the whole of the flood; and, when beating up with a commanding breeze, the eastern side should also have the preference, as, in mid-channel and on the coast of Istria, the current sets southwestward. The wind veers eastward toward the middle of the channel, and draws north-erly in the vicinity of the coast of Istria.

If overtaken by a bora in the middle of the passage, it is advisable, if far enough to windward and the wind not too violent, to make for Cherso Bay. Shelter may also be had in Ossero Channel at the northern end of Lussin, or under the lee of Cape Promontore if not too far advanced.

Quarnerolo Channel.—The passage between Asinello and Premuda Islands is about 4 miles wide; nearly midway is the islet of Gruica with its white light-tower. The Quarnerolo Channel is as much exposed to the bora as the Great Quarnero Channel, but, as the southern extremity of Lussin and Asinello Islands afford some shelter from the sea, vessels are enabled, except in a heavy gale, either to reach an anchorage or to close the shore. Premuda, Skada, Isto, and Melada Islands, protect this channel from southwesterly winds.

Route to Fiume.—If bound to Fiume or to Porto Re by the Quarnerolo Channel, a course should be steered for the channels between Veglia and Cherso; be prepared for a sudden blast of the bora when abreast of the passages southeastward of Arbe Island. In the narrow parts of the channel between Plaunick, Cherso, and Veglia Islands, the current varies greatly in rate and direction, and

is considerably influenced by the waters of the Fiumara or Reka River. The wind is often favorable for leaving Fiume when the sirocco prevails on the other side of the passes.

Bocca di Segna is generally taken when bound to Port Segna or Zengg or to Port Novi on the coast of Croatia. In this passage the current between Veglia and Pervicchio Islands is at times strong and the Bora so fierce and sudden in its approach that, even with a fair wind, it is prudent to keep under snug canvas. If unable to get through this pass, a vessel may anchor at Port Veglia or in the Barbato Channel on the southwestern side of Arbe Island.

Pago Channel is usually taken by vessels proceeding by the Morlacca Channel. Carlopago is the only town of any importance on this part of the coast. If bound to Jablanaz, Arbe Island should not be too closely approached in rounding its southeastern end, as a rocky 1-fathom bank lies 600 yards from its southeastern point.

Morlacca Channel is only used by coasting vessels, which, in the bad season, secure every night. Squalls from the high lands bordering it are dangerous, and there is no good anchoring ground along the rocky Croatian shore. Nona, on the mainland, is a town of but small importance; vessels reach it by the New Poveljana Channel between Pago and Puntadura Islands.

In quitting the Quarnero, no difficulties present themselves, as the wind generally, and the currents frequently, are favorable.

Route to Trieste.—After passing Cape Promontore, the coast of Istria should be kept aboard, especially with contrary winds; the vessel is then in a better position for anchoring, if necessary, and the current sets northward when within a short distance of the land. Along the coast, Cape Brancorso, the Brioni Islands, Rovigno, and numerous other towns and villages, with the several lighthouses, may be seen. Generally speaking, the weather becomes finer and the water smoother when northward of or on nearing, Rovigno. Having passed Rovigno, a course should be steered for rounding Salvore Point; from thence, the whole Gulf of Trieste is open and a course may be shaped for the town of Trieste.

When northward of Cape Promontore, southeasterly winds frequently veer to the southward; occasionally, and especially in winter, they become more easterly, in which case a bora may be expected. The high lands of Istria should be watched, and when they begin to be clouded, a place of shelter should be sought before the land becomes entirely concealed.

Frequently vessels arriving off Salvore Point with a fair breeze meet a contrary wind. In this case, if the weather is not threatening, it is advisable to stand to the northward on the starboard tack, when the vessel will probably break off and lay well up on the opposite

tack. The lead should be carefully attended to. Between Timavo and Grado, it is not safe for a vessel of moderate size to stand into less than $5\frac{1}{2}$ fathoms water, within which depth the soundings decrease rather suddenly.

The bora is violent in the Gulf of Trieste. Southwesterly and southeasterly winds, which blow dead upon the Venetian Coast, are equally dangerous but not so frequent. If overtaken by a heavy bora northward of Salvore Point and unable to reach Pirano anchorage, it is best to bear up for Umago, which is well protected by Salvore Point. It is not safe under such circumstances to anchor on the open coast between Salvore Point and Trieste.

When between Salvore Point and Cape Promontore, a vessel, unable from the violence of the gale to hold her own, may anchor anywhere within about 6 miles of the coast of Istria; outside of this, there is a heavy sea in bad weather; but, in case of emergency, she may without great danger anchor as far as 18 miles from the shore between Rovigno and Salvore Point, in depths of from 16 to 18 fathoms; this is preferable to the risk of being driven on the coast of Italy.

On entering the Gulf of Venice at night, if a southwesterly gale should arise, it is advisable to keep an offing until daylight.

Pilots were formerly procured off Rovigno, and it was therefore from this place that vessels usually took their departure for Venice or for the ports of the lagoons; in consequence, however, of political changes, of the excellent charts now in use, and of the increased number of lights, buoys, and beacons, this as an authorized pilotage station has been discontinued; but it is nevertheless prudent to sight and take a departure from the Istrian coast, where, also, favorable weather may be awaited for approaching the shores of Venice.

Venetian coast.—Caution is necessary in approaching this coast in sailing vessels, especially in thick weather when it is unavisable to attempt to sight it. Vessels of too deep draft to enter the ports should not close the shore in strong southeasterly or northeasterly winds, or when a long swell is setting in. Proceeding from Istria to Malamocco, the only port in the lagoons for a large vessel, a course should be shaped to allow for the southerly set of the current near the western shore, and great attention should be paid to the soundings. At night it is not prudent to stand into less than from 6 to 8 fathoms, which depths are from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles from the shore.

After rainy weather the currents are strong and the shoals at the entrances to the ports are affected by them. In the early part of the day, during summer, land breezes enable vessels to secure a favorable position for entering with the sea breeze, which sets in pretty regularly from southwest or from southeast; from the latter quarter,

often suddenly and with considerable strength, and, if a long swell should then be experienced with the land hidden by fog or mist and no time for the vessel to reach her port, one of the anchorages on the coast should be taken for the short period during which, at this season of the year, a southeaster may be expected to last.

In the winter the bora and southeasterly winds render the navigation of the coast between Piave Vecchia and Maestra Point almost impracticable, and coasting vessels then pass from Gora Bay to Venice by the inland channels.

In the summer it may be convenient for vessels to anchor off the Venetian shore at the distance of 2 or 2½ miles from the land, in a depth of from 6 to 7 fathoms, or farther off if necessary. The best anchorages are in Peloroso Road off Malamocco, or off Piave Vecchia or Cortellazzo. At Peloroso Road a vessel can more conveniently gain an offing on the approach of bad weather than from either of the other anchorages named. It is sometimes convenient to anchor here until daylight to enter Malamocco.

Trieste to Venice.—When bound to Venice from Trieste it is customary to coast along the land from Grado to avoid being set southward by the constant southerly current. For the same reason, in quitting the lagoon ports, and especially Chioggia, vessels should keep well off the land, and in a depth of not less than 15 or 16 fathoms while passing Maestra Point and the mouths of the Po where the shoals are constantly growing out to seaward.

Venice to Ancona.—Between Maestra Point and Rimini the coast should not be approached into a less depth than 16 or 17 fathoms, and in the neighborhood of Maestra Point, especially, owing to the rapid extension eastward of the shoal water caused by the deposit from the various mouths of the Po, the lead should be carefully attended to and the shore not approached within a distance of 4 miles. Southward of Rimini the depth increases and a nearer approach may be made, especially when proceeding southward, for the sake of the inshore current; in calms or with land winds, a vessel may anchor, if desired, in about 11 fathoms, 3 miles from the coast.

Ancona to Trieste.—Cape Promontore should be sighted, allowance being made on the way for the probability of being set southeastward by the current; from thence, the coast of Istria should be kept aboard.

Manfredonia.—The Gulf of Manfredonia affords the best refuge from a bora on the western coast, and would probably be within reach if a gale from this quarter should arise when southeastward of Lissa. The highland of Gargano is an excellent mark, and as soon as the mount is seen by a vessel from Cattaro, Ragusa, etc., or by one not yet westward of Lagosta Island, a course should be shaped to bring it a little on the starboard bow; but if the gale

should overtake the vessel when any distance beyond Lagosta, she would have to haul to the wind on the port tack in order to weather Gargano Head. When bound from Manfredonia to the neighborhood of Cattaro in the bora season it is advisable to sight Lagosta Island.

Tremiti Islands.—When westward of Lissa and unable to fetch the Gulf of Manfredonia, if overtaken by a bora too violent for the vessel to keep the sea, an attempt should be made to reach the Tremiti Islands, failing which there is no resource but the entirely exposed anchorages on the Italian coast and a dead lee shore. The islands are low by comparison with the adjacent mainland, but in weather such as is generally experienced during a bora they may occasionally be seen 10 miles distant. In making for the Tremiti Islands, care should be taken to insure clearing the low and dangerous Pianosa Islet, which is only 50 feet in height.

On quitting the Tremiti Islands or Gulf of Manfredonia for the coast of Dalmatia or to proceed farther up the Adriatic the eastern shore should be closed with as speedily as possible, especially in the winter season. If bound westward, the passage between Pelagosa and Pianosa Isles should be taken: San Andrea and Pomo Islets, and Mount Hum of Lissa Island, should be passed within view.

From Trieste outward.—If outward bound from Trieste, Venice, or the coast of Istria, it is customary to make Cape Promontore as a point of departure, especially in the autumn and winter seasons. The islands between it and Lissa should be coasted, following the directions given for proceeding northward, but in fine weather keeping farther from the shore to avoid in some measure the strength of the contrary current. Lagosta Island or its light should be seen, and from thence a direct course out of the Adriatic may be shaped. In summer, if the weather should promise to be fine vessels may venture to keep on the Italian shore for the sake of the southerly current.

In the winter season, on leaving Ancona, either from the eastern coast or to quit the Adriatic, the islands should be closed as soon as possible. The current sets southeastward during the first part of the route and more southerly near the middle. In moderate weather and with the approach of summer a course may be shaped northward of Pomo Islet in order to sight Lissa, etc.; but if bad weather should be apprehended, it is advisable to make at once for Gross Island and then coast along the islands.

On the Italian coast, in summer, vessels are almost always assisted by land breezes during the night and early part of the day, as well as by the currents, which are, however, feeble at a short distance from the shore. In light, contrary airs the anchor may be dropped at the distance of 2 or 3 miles from the land anywhere between

Ancona and Gargano Head, and even as far as Cape Otranto. As the coast is generally low, great attention should be paid to the soundings. At night a vessel should not stand into less than 9 or 10 fathoms, and, if signs of a bora are perceived, it is prudent, even in summer, to stand off at once. The Tremiti Islands, or Manfredonia, may then afford convenient anchorages, or Brindisi, if the vessel should be southward of Gargano Head.

In winter the Italian coast should be avoided, as it is a dangerous lee shore in bora gales, which are then so frequent. Nevertheless, this wind does not always blow home on the Abruzzo Coast owing to the high lands which border it, and where, during heavy weather in the offing, the land breeze often prevails throughout the night.

In the navigation of the Adriatic, more than in most localities, it is of importance to watch atmospheric appearances, and by attention to what has been said on this subject, the mariner may almost always observe some of the premonitory symptoms and obtain timely warning of the winds most to be apprehended.

Variation of the compass.—H. O. Chart No. 2406, "The Variation of the compass," should be consulted on all occasions before deciding on the variation to be allowed in shaping courses, etc.

Vessels marking wrecks.—When light vessels or other craft are placed to mark the position of wrecks in the ports and roadsteads of Italy they will be distinguished as follows, in order that mariners may be able to learn on which side of them they should go:

Vessels marking wrecks will have their top sides colored green and will exhibit—

By day.—Three balls from a yard, 20 feet above the sea; two placed vertically on the side, that shipping may safely pass, and one on the other side.

By night.—Three fixed white lights, similarly arranged, but the ordinary riding light will not be shown.

Mariners will thus know on sighting a wreck-marking vessel that she is so employed, and that they should pass on that side of her on which the two balls or two lights are shown.

N. B.—The Austrian, Turkish, and Greek Governments have not adopted this system of marking wrecks.

Light vessels.—The light vessels within the limits of this volume do not carry riding lights to indicate which way the vessel is riding.

Unwatched lights and light buoys.—Lights shown from buoys and from lighthouses without keepers can not be implicitly relied on, as if occulting the apparatus may get out of order or the light may be altogether extinguished. Sometimes the visibility of these lights is diminished by the deposit of salt, which, brought by the spray, covers the glasses of the apparatus.

Pilots—Steering commands.—Special attention is called to the fact that the French system of steering commands is adopted in Austria, Greece, and Italy. By this system the order starboard directs that the vessel's head shall be turned in a starboard direction, and the order port that the vessel's head is to be moved in a port direction. A clear understanding should be come to with any pilots taking charge.

Naval dock yards and establishments are to be found at Pola and Venice.

Dock accommodation.—There are Government dry and floating docks at Pola and Venice, but they are not available for foreign vessels, naval or mercantile, except in cases of urgent need. At Trieste there are large private establishments with spacious dry docks.

Patent slips.—There are patent slips at Brindisi, Fiume, and Trieste.

Particulars of the above are given in their several places; see also Appendix.

Coal.—Native coal may be obtained at some of the Austrian ports; it is, however, generally very sulphurous and bad for steaming purposes, unless mixed with English coal or used with specially constructed furnaces. English coal may be procured at any of the following ports, but at those marked with an asterisk (*), being either Government stores or those for special private use, coals are only supplied in cases of great necessity: Ancona, Argostoli (Cephalonia), Bari, Barletta, Brindisi, Cattaro (Kumbor),* Corfu, Fiume, Gravosa,* Lissa,* Malamocco (Venice), Methovic, Monopoli, Patras, Pola,* Ragusa, Rovigno, Sebenico, Spalato, Trieste, Venice, Zante, Zara.* Details are given in the descriptions of the ports named.

Buoys and beacons—Uniform systems—Coasts of Italy.—The Italian Government has directed that all buoys, beacons, and seamarks on the coasts of the Kingdom shall be painted according to the rule adopted by the congress of St. Petersburg; buoys to be left on the port hand entering a port or channel will therefore be painted red, and those to the left on the starboard hand, entering, will be painted black. The new coloring will be applied gradually, and notice will be given when the colors are changed.

Coasts of Austria.—A system of marking has been adopted, but has only been, as yet, partly carried out. The system is based on a combination of color and shape; channels or fairways bounded by shallow water on both sides will be marked by red spar buoys on the starboard side, and black conical buoys on the port side, entering from seaward.

Beacons on the starboard side entering will also be painted red, and those on the port side black; where necessary, for the purpose of

better distinction, beacons on the starboard side will be surmounted by a cone, and beacons on the port side by a cylinder.

Marks at seaward entrances to fairways will, if they are not already noticeable by conspicuous pile groups, lightbuoys, etc., be surmounted by spherical cages.

Small shoals outside fairways will be marked by perches, some of which will be surmounted by spherical cages or by spar buoys, surmounted by spherical cages.

Large shoals outside fairways will be marked by spar buoys or beacons surmounted thus: In the middle of the shoal by a cylinder, placed vertically; on the northern side of the shoal by two triangles, points upward; on the southern side of the shoal by two triangles, points downward; on the eastern side of the shoal by two triangles, the upper one point upward, and the lower one point downward; and on the western side of the shoal by two triangles, the point of which are toward each other.

No rules have as yet been laid down for the marks surmounting buoys, beacons, etc., indicating shoals extending offshore, or small banks close to the coast.

The coasts of Hungary, from Fiume to Maddelena Cove, are steep, with deep water, and no system of indicating the few existing sea-marks will be introduced.

Pilot vessels—Lights.—The following regulations with regard to pilot vessels have been adopted by the Italian, Austrian, and Greek Governments:

Pilot vessels, when engaged on their station on pilotage duty, shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all round the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed 15 minutes.

On the near approach of or to other vessels they shall have their side lights lighted, ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading. but the green light should not be shown on the port side nor the red light on the starboard side.

A pilot vessel, of such a class as to be obliged to go alongside a vessel to put a pilot on board, may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand ready for use a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

A steam pilot vessel exclusively employed for the service of pilots licensed or certified by any pilotage authority of the committee of any pilotage district, when engaged on her station on pilotage duty and not at anchor, shall, in addition to the lights required for all

pilot boats, carry, at a distance of 8 feet below her white masthead light, a red light visible all round the horizon, and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 2 miles, and also the colored side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and at anchor she shall carry, in addition to the lights required for all pilot boats, the red light above mentioned, but not the colored side light.

Pilot vessels, when not engaged on their station on pilotage duty, shall carry lights similar to other vessels of their tonnage.

Fishing vessels—Lights.—Fishing vessels and fishing boats when under way, and not required by this article to carry or show the lights hereinafter specified, shall carry or show the lights prescribed for vessels of their tonnage under way.

(a) Open boats, by which is to be understood boats not protected from the entry of sea water by means of a continuous deck, when engaged in any fishing at night with outlying tackle extending not more than 150 feet horizontally from the boat into the seaway, shall carry one all-round white light.

Open boats, when fishing at night with outlying tackle extending more than 150 feet horizontally from the boat into the seaway, shall carry one all-round white light, and, in addition, on approaching or being approached by other vessels shall show a second white light at least 3 feet below the first light, and at a horizontal distance of at least 5 feet away from it in the direction in which the outlying tackle is attached.

Vessels and boats, except open boats as defined in subdivision (a), when fishing with drift nets, shall, so long as the nets are wholly or partly in the water, carry two white lights where they can best be seen.

Such lights shall be placed so that the vertical distance between them shall be not less than 6 feet and not more than 15 feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than 5 feet and not more than 10 feet. The lower of these two lights shall be in the direction of the nets, and both of them shall be of such a character as to show all round the horizon and to be visible from a distance of not less than 3 miles.

Within the Mediterranean Sea sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of the two lights. Should they, however, not carry it, they shall show in the same position (in the direction of the net or gear) a white light visible from a distance of not less than 1 mile on the approach of or to other vessels.

Vessels and boats, except open boats as defined in subdivision (a), when line fishing with their lines out and attached to or hauling their

lines, and when not at anchor or stationary, shall carry the same lights as vessels fishing with drift nets. When shooting lines or fishing with towing lines they shall carry the lights prescribed for a steamer or sailing vessel under way, respectively.

Within the Mediterranean Sea sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of the two lights. Should they, however, not carry it, they shall show in the same position (in the direction of the lines) a white light visible from a distance of not less than 1 mile on the approach of or to other vessels.

In fog, mist, falling snow, or heavy rainstorms drift-net vessels attached to their nets and vessels when trawling, dredging, or fishing with any kind of drag net, and vessels fishing with their lines out, shall, if of 20 tons gross tonnage or upward, at intervals of not more than one minute, make a blast—if steam vessels, with the whistle or siren, and if sailing vessels, with the fog horn, each blast to be followed by ringing the bell. Fishing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals, but if they do not they shall make some other efficient sound signal at intervals of not more than one minute.

Tunny fisheries—Marking.—Tunny fisheries on the coasts of Italy are marked thus:

1. Tunny fisheries proper:

(a) The point at which the nets are attached to the shore is marked by a mast not less than 33 feet in height, surmounted by a disk 6 feet in diameter, painted in concentric white and black bands, and exhibiting at night two white fixed lights 6 feet apart and visible 3 miles.

(b) The outer left-hand extremity of the nets as seen by an observer situated at the point at which the nets are attached to the shore is marked by a buoy, boat, or floating mark, surmounted by a spar 16 feet in height, carrying by day two black balls placed vertically 6 feet apart and by night two fixed lights placed vertically 6 feet apart, the upper green, the lower white, visible 2 miles.

(c) The outer right-hand extremity of the nets, as seen by an observer situated as in (b), is marked by day as above (a mast and two balls) and at night by two fixed lights placed vertically 6 feet apart, the upper red, the lower white, and visible 2 miles.

The above-mentioned marks are on the outer limit of the tunny nets, or placed outside it should the lights be a hindrance or obstacle to the fishing.

2. Smaller tunny fisheries:

(a) The point where the nets are attached to the shore is marked as above.

(b) The outer end of the nets is marked by day by a buoy, boat, or other floating mark, surmounted by a mast 16 feet in height, with two balls placed vertically 6 feet apart, and at night by two fixed lights placed vertically 6 feet apart, the upper red, the lower white, visible 2 miles.

3. Tunny-fishery nets laid out in an anchorage:

In addition to the foregoing every anchor for nets is marked by a buoy or otherwise.

CHAPTER II.

CAPE SPARTIVENTO, TO CAPE SANTA MARINA DI LEUCA.

[The west coast of Italy is described in H. O. No. 152, Mediterranean Pilot, vol. II.]

The South coast of Italy, from Cape Spartivento, trends northeastward 40 miles to Stilo Point; the land between falling back to the westward forms a bay 4 miles deep, with a low sandy beach, which, however, at a short distance inland attains a considerable elevation. The coast should not be approached within 1 mile, and, excepting with land winds, affords no sheltered anchorage.

Cape Spartivento (ancient Herculeum prom.) is 158 feet high, rugged, rocky, and bordered by a narrow sandy beach; shoal water extends a short distance off, but the cape can be closed to the distance of $\frac{1}{2}$ mile.

Light.—A flashing white light is exhibited, at 210 feet above high water, from a white square tower, 51 feet high, against a white two-storied house on Cape Spartivento. Visible 21 miles. (See Light List.)

Signal station.—There is a semaphore close to the lighthouse, and 151 feet above high water. The house is painted black and white in checkers.

Storm signals are exhibited at the semaphore.

The coast from Cape Spartivento trends northeastward 40 miles to Punta Stilo and is a low sandy beach, backed by hills, and further inland by mountains of moderate elevation. The coast should not be approached to less than 1 mile and does not afford safe anchorage except with offshore winds.

Most of the villages on this coast, having the houses parallel to the beach, appear large from seaward, while they are of no importance.

Torre Sperlonga, 302 feet above high water, is on a small rocky hill 3 miles northeastward of Cape Spartivento, and a sunken rocky bank extends about 300 yards seaward from the coast below it. **Marina di Brancaleone** is situated northeastward of the tower; the village of the same name, with a campanile, 1,148 feet above high water, is 1 mile northwestward of its marina. **La Fiumarella**, the

mouth of which is on the northeastern side of the marina, is crossed by a masonry bridge with three arches.

Scoglio Monistili, about 2 miles northeastward of Torre Sperlonga, and close to the shore, is small.

Cape Bruzzano (ancient Zephyrii prom.), about 5 miles northeastward of Torre Sperlonga, is rocky, and there is a conspicuous tower, 479 feet above high water, on the summit of a little hill on its southern side; some small rocks border the cape. Monte Scapparone, 3,465 feet high, $5\frac{1}{2}$ miles westward of the cape, is bare, with a thin wood on its summit, and about midway between is Monte Ferruzzano, 1,542 feet high, with the village of the same name on its summit, conspicuous from seaward.

Bianco, a village with a population of about 2,460, is near the coast, 3 miles northeastward of Cape Bruzzano, and the hills behind it are of a light color. About $2\frac{1}{2}$ and 3 miles northward of Bianco are the mouths of Fiumare Buonomico (Buonamico) and Careri; the beach between the Buonomico and Marina di Ardore shows as a long clear stripe from seaward.

Marina di Bovalino is about $3\frac{1}{2}$ miles northward of Bianco; the large square Torre Spinosa, in front of it, does not show well from a distance seaward, being seen against the houses. Bovalino, about $1\frac{1}{2}$ miles northwestward, is 692 feet above high water, and its campanile is noticeable.

Torre di Gerace, on the coast 4 miles northeastward of Torre Spinosa, is almost destroyed. Marina di Gerace is on the coast 2 miles northeastward of the tower, and Gerace village is on ground 1,571 feet high, 3 miles northwestward. The ruins of the old town, which was destroyed by the earthquake in 1783, cover an extent of 2 miles. There is a red mooring buoy in $3\frac{1}{2}$ fathoms water about 400 yards off the marina.

Marina di Siderno, about 2 miles northeastward from that of Gerace, has a population of about 10,780 and is the most important off the coastal villages in this locality. Siderno, about $1\frac{1}{2}$ miles northwestward, is only partly seen on the side of a mountain from near the coast. There is a red mooring buoy in 5 fathoms water about 300 yards off the coast in front of the marina.

Gioiosa, a town with a population of about 11,200, is situated about $2\frac{1}{2}$ miles inland and 4 miles northward of Marina di Siderno, but a succession of houses, concealed from off the coast by the hills, is scattered on the left bank of Fiumara Turbolo, and connects it with its marina.

Monte Sant' Andrea, 2,306 feet high, 3 miles northeastward of Gioiosa, is a good mark.

Roccella Jonica (ancient Romechium), 4 miles eastnortheastward of Marina di Gioiosa, is a village with a population of about 6,340

inhabitants, and behind it is a rocky hill surmounted by a large old citadel, northward of which is an old tower, about 500 feet above high water.

A slight rise of the sandy bottom, perhaps produced by the alluvium from Fiumare Turbolo and Allaro, has been noticed about 300 yards off Roccella Beach.

Anchorage can be obtained with off-shore winds in front of the marina in 8 fathoms water, or near the beach in $2\frac{1}{2}$ fathoms water, good holding ground.

Buoy.—A red cylindrical mooring buoy lies, in $3\frac{1}{4}$ fathoms water, about 300 yards off the beach of Roccella Jonica.

(NOTE.—Carried away in 1916; will probably be replaced.)

The coast.—Torre Cammilari, 134 feet above high water, and white, is on a coast hill covered with olives, situated between the iron bridges crossing Fiumare Amusa and Allaro. Torre San Fili, 370 feet above high water and circular, is on an arid hill, with olives on the summit, 2 miles northeastward of Torre Cammilari. Torre di Riace (Riace), 321 feet above high water, and Torre Vellera (Vedera), 266 feet above high water, are near the coast, $2\frac{3}{4}$ and 4 miles, respectively, northeastward of Torre San Fili. The large villages Caulonia and Stignano are noticeable from seaward.

Mariana di Monasterace (Monasterace), about $1\frac{1}{2}$ miles northeastward of Torre Vellera, has always some large boats hauled up on the beach.

Stilo Point is low and sandy, and on it are the ruins of a lighthouse destroyed by an earthquake. Monte Stella, 7 miles westward of the point, is 3,435 feet high, and noticeable; Monte Consolino, about 2 miles northeastward of it, is an immense and rugged rock, 2,300 feet high, with almost vertical sides. On its eastern side is Stilo Village.

Light.—An occulting white light is exhibited, at 144 feet above high water, from a circular masonry turret 14 feet high, with a one-story house and a hut for the generator adjoining, on Point Stilo. Visible 18 miles. (See Light List.)

Gulf of Squillace (ancient Scylleticus sinus) extends about 14 miles northwestward from its entrance between Point Stilo and Cape Rizzuto, 36 miles northeastward. The shore of the gulf is low, sandy, and, from July to November, infested with malaria. Inland at various distances are the high and generally green spurs of the Calabrian Apennines.

Many streams flow into the gulf; they are generally torrents, and dry in summer. The railroad runs along and a short distance from the shore.

The shores are clear at a short distance; the depths are considerable, the 100-fathom curve being less than 1 mile off the north-

western shore in places. There is no shelter from winds from seaward.

The coast from Stilo trends northward 19 miles to Punta di Staletti. Fiume Assi flows into the gulf a little northward of Punta Stilo Lighthouse; Marina di Vincerello is $1\frac{1}{2}$ miles northward of the mouth of the river, and near the coast a little farther northward is Monte San Paolo, 341 feet high. Marina di Sant' Antonio is 2 miles northward of Monte San Paolo and about 2 miles westward of it is Santa Caterina del Jonio Village, situated halfway up a mountain 1,575 feet high; it has a conspicuous campanile. Marina di Badolato is about 3 miles northward of Marina di Sant' Antonio; the houses, being between woods, do not show well. Badolato Village is about 2 miles inland. The anchorage off the marina is considered the best in this locality. Anchor in 8 fathoms water about 1,400 yards off the coast, or in small craft in 3 fathoms about 200 yards off the coast, eastward of the railroad station.

Sant' Andrea Apostolo Village, 3 miles northward of Badolato, is on a hill 1,017 feet high and on its southern side is a church with a pointed campanile.

Marina di Soverato is 4 miles northward of Sant' Andrea Apostolo, and the coast in front of it is very steep, so that sailing vessels anchor close off it, and some of from 50 to 60 tons displacement go alongside the beach and load by the aid of brows. There is a cement wharf on the beach.

Scoglio Pietra Grande is the largest of a group of rocks close to the coast 3 miles northward of Soverato.

Staletti Point (lat. $38^{\circ} 45' N.$, long. $16^{\circ} 34' E.$) is the eastern extremity of a promontory (called Coscia or Monte di Staletti) partially covered with vegetation, the coasts of which are generally rocky. There is a long railroad viaduct with 12 arches near the point. Staletti Village is on the summit of a mountain, 1,253 feet high, about $1\frac{1}{2}$ miles inland.

Squillace Village (ancient Scyllacæum) is on a remarkable conical mountain, 1,132 feet high, $1\frac{1}{2}$ miles northwestward of Staletti.

Marina di Catanzaro, 4 miles northeastward of Staletti Point, is the most important in the district. Fiume Corace, which flows into the gulf on the southern side of the marina, has a small sand bank at its mouth. The town is about 5 miles northward of the marina, and from seaward appears like a large white patch on the mountains; the population is about 32,000. The country around is richly cultivated, producing large quantities of silk and olive and walnut oil.

Light.—An occulting red light is exhibited, at 43 feet above high water, from an iron framework structure on a masonry base, 30 feet

high, on the beach of Marina di Catanzaro, visible 8 miles. (See Light List.)

Buoy.—A red iron mooring buoy lies in 21 fathoms about 500 yards off the beach of Marina di Catanzaro.

Anchorage.—The depth off the marina is too great for convenient anchorage.

Communication.—Marina di Catanzaro is on the Reggio-Metaponto Railroad. Steamers running between Palermo, Messina, and Brindisi call weekly.

The coast from Marina di Catanzaro trends east-northeastward 18 miles to Barco Vercillo; anchorage can be obtained with off-shore winds $\frac{1}{2}$ mile from the coast between the marina and Fiumara del Crocchio, 11 miles to the eastward, and one mile off the coast, thence to Barco Vercillo. Torre del Crocchio, on the right bank of the river of the same name, is dark and noticeable; there is a house westward of it.

Cropani Village, 4 miles northwestward of Torre del Crocchio, is 1,115 feet above high water, and its church, which has on its northeastern side a crushed dome and on its southwestern side a sharp campanile, is noticeable.

Barco Vercillo anchorage is used by small vessels, which anchor in about 3 fathoms water, sand, from 300 to 400 yards offshore, sheltered from winds between west, through north, and east. San Leonardo Village is in the locality.

The coast from Barco Vercillo trends southeastward 3 miles, to Le Castella, and a rocky bank with less than 3 fathoms water extends $\frac{1}{2}$ mile off it.

Le Castella is a group of ruins, surmounted by a large cylindrical tower, on a little peninsula, which gives its name to a small fishing village behind it.

Secca delle Castella, about 900 yards southwestward of Le Castella, is nearly 400 yards in extent, with $1\frac{3}{4}$ fathoms least water; there are depths of from $3\frac{1}{4}$ to $5\frac{1}{4}$ fathoms between the shoal and Le Castella. The two towers on Cape Rizzuto in range lead about $1\frac{1}{2}$ miles southward of the shoal, which is covered by a red sector of Cape Rizzuto lower light.

The coast between Le Castella and Cape Rizzuto, $3\frac{1}{4}$ miles to the eastward, forms a bay which extends about 1 mile to the northward. The shores of the bay are steep, rocky, and moderately high, and Cape Piccolo, a small, low, rocky promontory, projects from the shore about $2\frac{1}{2}$ miles eastward of Le Castella. The depths in the bay are irregular and rocky, and the 10-fathom curve is from 1,000 to 1,800 yards offshore. There is a rock with 2 fathoms water nearly 1,400 yards offshore in the middle of the bay, and a rock with 3 fathoms water 1,200 yards farther eastward.

There is anchorage eastward of Le Castella; also on the eastern side of the bay, sheltered from northerly and easterly winds, where great care is required when anchoring.

Cape Rizzuto (ancient Japygumtria) (lat. $38^{\circ} 54' N.$, long. $17^{\circ} 6' E.$) is the extremity of a low rocky peninsula with steep coasts, which projects about 1,600 yards southward from the coast line. There are two towers on the peninsula; the western one is 46 feet above high water and square, the eastern one 42 feet and round. The houses of Madonna Greca Village, about 800 yards northeastward of the round tower, are noticeable.

Lights.—A flashing white light is exhibited, at 121 feet above high water, from a white octagonal tower 72 feet high, with a one-storied house, on Cape Rizzuto, visible 17 miles.

A fixed red light is exhibited, at 118 feet above high water, from the same tower, visible 12 miles. (See Light List.)

Secche di Cape Rizzuto or di Madonna Greca, about $1\frac{1}{2}$ miles east-northeastward from the cape, has 2 fathoms water, and $\frac{3}{4}$ mile farther east-northeastward is a patch with $4\frac{1}{2}$ fathoms water; these shoals are covered by a red sector of Cape Rizzuto lower light.

Light buoy.—A red cylindrical light buoy, surmounted by a staff and exhibiting a flashing white light, is moored near the southeastern end of the $4\frac{1}{2}$ -fathom patch just mentioned.

The coast from Cape Rizzuto trends northeastward 10 miles to Cape Colonne, and is generally rocky cliffs from 50 to 65 feet high. Cape Cimiti, 5 miles northeastward of Cape Rizzuto, is the extremity of a low rocky promontory, off which a bank with $4\frac{1}{2}$ fathoms water extends more than $\frac{1}{2}$ mile northeastward.

Torre Scifo, on the coast, $3\frac{1}{2}$ miles northward of Cape Cimiti, is square, with some windows.

Anchorage can be obtained southward of Cape Colonne Peninsula in about 10 fathoms water, with Torre Scifo bearing 284° and Cape Colonne Lighthouse 30° , sheltered from northwesterly and northerly winds.

Cape Colonne (ancient Lacinian prom.) is the eastern end of a peninsula which projects about 1 mile eastward from the coast line; its coasts are rocky cliffs about 60 feet high. There are some houses, uninhabited in winter, an old and large square tower, and a small church on the cape; also the ruins of Tempio di Giunone Lacina, and a fine large Doric column.

A bank, with $\frac{3}{4}$ fathom least water, extends $\frac{1}{4}$ mile eastward from the coast about 400 yards southward of the northern extremity of the cape.

Light.—A fixed white light is exhibited, at 133 feet above high water, from a white octagonal tower over a white two-storied house, 64 feet high, on Cape Colonne, visible 18 miles.

Signals for assistance are made by day. (See Light List.)

Signal station.—There is a semaphore, 472 feet above high water, on a hill about 2 miles westward of Cape Colonne; the house, with a tower, is painted black and white in checkers.

Storm signals are exhibited from the semaphore.

Taranto Gulf.—Cape Santa Maria di Leuca lies 71 miles north-eastward of Cape Colonne, and Taranto Gulf extends 70 miles north-westward from between them.

The western shore of the gulf is backed by the mountains of the Calabrian Apennines with some remarkable summits; the eastern is low and flat with some hills inland. A beach, generally sandy, surrounds the gulf and the land on its northwestern side is swampy and infested with malaria.

Winds.—In winter northeasterly winds prevail, and usually last from three to seven days at a time. Southerly winds, violent but of less duration, raise a heavy sea, and it is dangerous to be caught by these at anchor on the coast.

In summer, after a period of calm, there are sometimes strong northwesterly to northeasterly winds of short duration called tormenta, which are indicated by thick clouds on the horizon with lightning.

The sea in the gulf is heavy with northeasterly to southeasterly winds.

Currents.—A current generally sets southward along the west shore of the gulf at a rate of less than 1 knot; southerly winds influence its direction, and when fresh and durable, or before a strong southeasterly wind, the current may set northward. The currents on the east shore are much affected by the winds, and a northerly current often indicates strong southerly winds.

The coast from Cape Colonne trends northwestward $4\frac{1}{2}$ miles to Cotrone, and some rocks lie close off it in places.

Anchorage.—There is anchorage during off-shore winds in about 8 fathoms water, with the semaphore bearing 180° and Cape Colonne (extremity) 120° ; also southeastward of Cotrone town in 7 fathoms water, with Molo Vecchio Lighthouse 330° and the cemetery 255° .

Cotrone (ancient Croton) (lat. $39^\circ 05' N.$, long. $17^\circ 08' E.$), a town with a population of about 9,550, is built on a hill southward and westward of a conspicuous fort. The trade of the town is not of much importance and consists chiefly in exports of cereals, oil, and wood.

Porto Vecchio di Cotrone, southeastward of the town, is within a mole and its entrance is open south-southwestward. The area of the port is very restricted, and the greatest depth is $2\frac{3}{4}$ fathoms in

the middle, decreasing to the sides; it is slowly but continuously silting up. The port is safe with all winds; during fresh easterly winds the sea breaks at the mouth, and, while it does not trouble vessels in the port, it makes entrance dangerous.

Rocks.—The 5-fathom curve is about 300 yards eastward of the mole, and there are several rocks between.

Porto Nuovo di Cotrone lies westward of a mole which extends about $\frac{1}{2}$ mile northward from the mole of Porto Vecchio. There were depths of from 4 to 6 fathoms in the northeastern part of the port, but less depths have been reported, and a shoal bank extends from 200 to 500 yards off the shore.

In 1896 the mole was partially destroyed, rendering caution necessary in approaching the port and making the anchorage insecure in bad weather, especially in easterly gales.

Lights.—A fixed green light is exhibited, at 30 feet above high water, from an iron crane with a masonry hut, about 40 yards from the south end of the mole of Porto Vecchio. Visible 7 miles.

A fixed white light is exhibited from a post on the health-office jetty, Porto Vecchio. Visible 5 miles.

An occulting light with white and red sectors is exhibited, at 39 feet above high water, from a masonry turret on the head of the mole of Porto Nuovo, visible 8 miles. (See Light List.)

The coast from Cotrone trends northward 19 miles to Alice Point and is a sandy beach with gravel in places and depths of 4 fathoms about $\frac{1}{4}$ mile off it.

Fiume Neto flows into the gulf, through a low wooded projection, $7\frac{1}{2}$ miles northward of Cotrone; there is deep water off the mouth, but a rock, with about 3 feet water, lies about 100 yards northeastward from the north entrance point.

A small bank, with 82 fathoms water, and from 110 to 244 fathoms around, lies $5\frac{1}{2}$ miles east-southeastward of the mouth of Fiume Neto.

Strongoli, on a hill, 1,102 feet high, about 6 miles northwestward of the mouth of Fiume Neto, has a remarkable castle on its southern side. San Nicolo dell' Alto, about $3\frac{1}{2}$ miles northwestward of Strongoli, is a mountain with a sharp peak, 2,027 feet high.

Torre Melissa, on a little hill, 151 feet high, near the sea, 6 miles northward of Fiume Neto, is large and a truncated cone in shape.

Torre Nuova, on the beach $3\frac{1}{2}$ miles northward of Torre Melissa, is very old, pink in color, and falling into ruins.

Marina di Ciro or La Baracca, northward of Torre Nuova, is a long line of houses on the beach, which is steep-to. Ciro village, $3\frac{1}{2}$ miles to the westward, has a population of about 7,000; it is 1,092 feet above high water and conspicuous from seaward. The railroad station is $\frac{1}{2}$ mile from the marina.

Alice Point (lat. $39^{\circ} 24' N.$, long. $17^{\circ} 09' E.$) is low, sharp, and bold; its extremity is sandy and bare, but the land within is covered with vegetation.

Light.—A flashing white light is exhibited, at 98 feet above high water, from a white octagonal tower, on a white house, 79 feet high, on Alice Point, visible 15 miles.

The coast from Alice Point trends northwestward about 8 miles to Fiumenica Point and is sandy.

Torre Vecchia, $1\frac{1}{2}$ miles westward of Alice Point, is square, and anchorage can be obtained off it during south to west winds; the little church of Madonna di Mare, near and a little higher than the tower, is noticeable.

Crucoli village is situated on a wooded hill $2\frac{1}{2}$ miles inland and 7 miles westward of Point Alice.

Fiumenica Point, the eastern entrance point of the torrent of the same name, is low, and on it is the isolated, square Torre del Policaretto.

The coast from Fiumenica Point trends northwestward $14\frac{1}{2}$ miles to Cape Trionto, and is sandy.

Cariati village, with a population of about 4,300, is situated near the coast $3\frac{1}{2}$ miles west-northwestward of Fiumenica Point, on the slope of Monte Acquaviva, which is 1,460 feet high; in the village is a cupola covered with majolica tiles.

Calopezzati Village is on a hill, 708 feet high, about 1 mile inland and 8 miles northwestward of Cariati; there is a castle on its southern side.

Anchorage can be obtained, in depths of from 3 to 14 fathoms, off Cariati during offshore winds.

Cape Trionto (lat. $39^{\circ} 37' N.$, long. $16^{\circ} 46' E.$) is low, and covered with thick woods, which obscure the tower on the point; the water off the point is deep.

The coast from Cape Trionto curves westward and northward 15 miles to Cascio Point, and is low and sandy, with several streams flowing through it into the sea. Sant' Angelo Village, which is the Marina de Rossano, is on the coast 6 miles westward of Cape Trionto.

Rossano town (ancient Rosicanum), nearly 3 miles southward of the marina and on a hill, 1,017 feet high, has a population of about 13,350; there is some trade in olive oil and liquorice.

Buoy.—A red iron cylindrical mooring buoy lies in the anchorage off Marina di Rossano.

Anchorage.—The small vessels, which load with oil and liquorice, anchor off the marina in about 25 fathoms water, 160 yards off the beach, with a hawser to the shore, in fine weather, but keep ready to sail on the first sign of wind from seaward.

Winds.—In winter, northerly and easterly winds alternate with short periods of calm and southerly winds. Westerly winds are often violent, especially in summer.

Currents.—The current sets almost constantly southeastward in winter, except when strong southerly winds have been blowing, which turn it to the northwestward; the velocity of the current is about 1 knot, increasing near the coast.

Corigliano, 5 miles westward of Rossano, is situated on a hill, 718 feet high, about $3\frac{1}{4}$ miles inland. A castle rises above the houses of the town, and is conspicuous from seaward. The population is about 15,380.

Schiavonia, $4\frac{1}{2}$ miles northwestward of Sant' Angelo, may be considered the Marina di Corigliano, and is frequented in summer for bathing. A tower with two watch houses in front of it stands on the beach, where there are also two buildings with a long colonnade between them.

Cascio Point (lat. $39^{\circ} 43' N.$, long. $16^{\circ} 32' E.$) is at the mouth of Fiume Crati, which rises in the forests of Sila and has a course of about 50 miles. There are two narrow banks in the mouth, with about 7 feet water. There is deep water a short distance off the point. The water from the river, after heavy rains, discolors the sea for some miles off it. The land near Cascio Point is an extensive plain covered with thick vegetation.

The coast from Cascio Point trends north-northeastward 15 miles to Cape Spulico, and is sandy. On the coast about 1 mile northwestward of Cascio Point is Casa Bianca, about $\frac{1}{2}$ mile off which anchorage can be obtained in from 11 to 16 fathoms water, mud bottom, open to seaward. Inland the country is thickly wooded.

Torre Cerchiara, on the beach nearly 4 miles northward of Casa Bianca, is light in color. The locality is very unhealthy on account of the marshes in the vicinity.

Villapiana is a little village on a hill, 682 feet high, 3 miles north-northwestward of Torre Cerchiara. Torre Villapiana, on the beach between a red house and a little iron bridge, is cylindrical.

Trebisacci (Trebisacce) (lat. $39^{\circ} 52' N.$, long. $16^{\circ} 32' E.$), 5 miles north-northeastward of Torre Cerchiara, is built on a whitish spur, 240 feet high, from the mountains, which extends, with steep sides, on to the beach, where there is Marina di Trebisacci, which consists of a row of houses and a red railroad station. Amongst the houses of the higher village is a church with a cupola and a square, sharp campanile.

Pizzo delle Armi, 4,721 feet high, and Monte Pellari, 4,383 feet high, locally named Due Sorelle, are two sharp summits, close together and similar in shape, belonging to the same mountain, situ-

ated 7 miles westward of Trebisacci, which is rugged, rocky, and imposing.

Buoy.—A red cylindrical iron mooring buoy lies on the line of the extension of a small pier at Marina di Trebisacci, and about 500 yards offshore.

Anchorage.—There is anchorage in 11 fathoms $\frac{1}{2}$ mile and in $2\frac{1}{2}$ fathoms 300 yards off the shore of Marina di Trebisacci.

Torre di Albidona, 3 miles northeastward of Trebisacci, and on the edge of a steep spur, 259 feet high, the sides of which are cultivated, is circular.

Amendolara Village, with a population of about 2,300, lies on a hill, 777 feet high, $2\frac{1}{2}$ miles northward of Torre di Albidona and $1\frac{1}{2}$ miles inland. There are a few houses and a railroad station at the marina, northeastward of the mouth of Fiume Straface.

Secca Amendolara, 7 miles southeastward of Cape Spulico, is a bank about $\frac{1}{2}$ mile in extent, with 14 fathoms water, and from 21 to 26 fathoms close around.

Cape Spulico, very low and partly covered with woods, projects somewhat seaward at the mouth of Fiumara Ferro; the 5-fathom curve is about $\frac{1}{2}$ mile off it. A circular tower stands on the coast southward of the cape.

The coast from Cape Spulico trends northward 9 miles to the mouth of Torrente Canna and is high; there are depths of $4\frac{1}{2}$ fathoms and more at the distance of $\frac{1}{2}$ mile, but many rocks lie close off it.

Roseto Village is situated on a green hill, 689 feet high, 2 miles northwestward of Cape Spulico; **Castello di Roseto**, on the coast, about $1\frac{1}{2}$ miles northward of the cape, is noticeable.

Montegiordano, $4\frac{1}{2}$ miles northwestward of Roseto, is 1,965 feet high, and on it is a village of the same name, with a campanile.

Marina di Rocca Imperiale is on the coast near the mouth of Torrente Canna, and on the slope of a hill about 2 miles westward of it is **Rocca Imperiale** Village, with a population of about 2,060; it has a conspicuous castle.

Torre Canna, on the left bank of the mouth of Torrente Canna, is large and square, and near it is the red railroad station.

The coast between Torrente Canna and Punta Rondinella, 34 miles northeastward, is low, the country being marshy, wooded in places, and traversed by many streams which form numerous swamps; it is uninhabited, as it is infested with malaria, especially in summer and autumn.

Torre Bollita, on the beach, about $1\frac{1}{2}$ miles northeastward of the mouth of Torrente Canna, is circular.

Fiume Sinni flows into the sea about 4 miles northeastward of Torrente Canna; the river has a course of 60 miles through a dense

forest and underwood. The mouths of the river form a sandy point which projects considerably seawards; the muddy water from the river often discolors the sea to a distance of about 2 miles, but there are depths of about 5 fathoms $\frac{1}{2}$ mile off the point.

Between Fiume Sinni and Fiume Agri, 5 miles northeastward, are several lagoons close to the beach; the country is well wooded and produces large quantities of licorice. Wild boar, deer, and other game abound.

Torre Scanzano, on the beach nearly 3 miles northward of Fiume Agri, is large, square, and isolated. Pisticci Village, 12 miles northwestward of Torre Scanzano, is 1,188 feet above high water and noticeable from the whiteness of its houses.

Torremare is about $7\frac{1}{2}$ miles northeastward of Torre Scanzano and between Fiumi Basento and Bradano; near it are the ruins of Metaponto, a Greek colony, and there is a railroad station here at the junction of the lines from Naples to Brindisi and from Reggio to Metaponto.

Torre Mattoni, on the beach about 2 miles northeastward of Fiume Bradano, is square and dark in color.

Torre Lato, on the right bank of Fiume Lato, which flows into the sea about 7 miles northeastward of Torre Mattoni, is square; the mouth of the river is crossed by an iron railroad bridge. The surrounding low hills are covered with dwarf pine, juniper, and cypress; there is also much marshy land. The water is shoal for a short distance off Torre Lato.

Castellaneta Village, 803 feet above high water, 9 miles northward of Torre Lato; Muttola (Mottola) Village, 1,270 feet above high water, 4 miles eastward of Castellaneta; and Massafra Village, 361 feet above high water, 5 miles southeastward of Mottola, are conspicuous from seaward.

Secca Amerleia (Armeleja), about 3 miles eastward from Torre Lato and $1\frac{1}{2}$ miles from the north shore, is a bank of rock and weed, about 1 mile long east and west, with from 9 to $5\frac{1}{2}$ fathoms water, and from 14 to 16 fathoms around. The sea breaks on the bank during strong southerly winds when it is advisable to pass well to seaward of it.

Rondinella Point (lat. $40^{\circ} 29' N.$, long. $17^{\circ} 11' E.$) is the southwestern extremity of a low projection and there is a square tower on it. A bank with shoal water extends upwards of 1 mile off the coast for 2 miles northwestward of the point, and westward of the point are some small patches with from $2\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water; Cape San Vito lighthouse open southward of Isola San Pietro leads southwestward of the bank and patches. The tower on Casa Montello, about 1 mile northeastward of Punta Rondinella, is white, high, slender, and conspicuous.

Mar Grande, the outer harbor of Taranto, is a semicircular indentation $3\frac{1}{4}$ miles wide between Rondinella Point and the Promontory of Cape San Vito to the south-southeastward, and it extends about $3\frac{1}{2}$ miles east-northeastward from Isola San Paolo in the entrance. It is protected from seaward by Isola San Pietro and San Paolo, with shoal banks, and is a spacious anchorage, open only to the southwestward and available for vessels of any size. Mar Piccolo, the inner harbor, is connected with Mar Grande by a canal.

Fortified port.—Taranto is a fortified port. See Regulations.

Isola San Pietro, $1\frac{1}{2}$ miles south-southwestward of Punta Rondinella, is about $1\frac{1}{2}$ miles long east and west, with a greatest breadth of $\frac{1}{2}$ mile, low rocky, and irregular in outline; there are several houses and sheds on it. A rocky spit and shoal banks extend between Rondinella Point and Lo Scanno Point, the northern point of the island. The water between Isola San Pietro and Isola San Paolo, 1,200 yards southeastward, is also shoal and a bank, with 6 feet and less water, extends 400 yards off the south coast of San Pietro.

Pier.—A masonry landing pier extends off the east coast of the island a little northwestward of a noticeable group of sheds; care is necessary in approaching it.

Buoy.—A mooring buoy lies about 200 yards eastward of the pier.

Barriers—Caution.—A submerged mole extends between Rondinella Point and Lo Scanna Point; a submerged mole extends between Isola San Pietro and San Paolo; there is no passage over these moles. these moles.

Isola San Paolo is about 500 yards long east and west, 100 yards broad, low, and surrounded by shoal water, which extends nearly 200 yards from the south coast and about 400 yards from the northwest point. There is a little port in the middle of the north coast of the island, protected by two small moles; it has depths of about 2 fathoms, the deepest part being near the eastern mole, which is the longer of the two. The port is used by tugs and naval boats.

Light.—A group flashing light is exhibited, at 52 feet above high water, from an iron trellis frame on a masonry building, 42 feet high, on the eastern end of Isola San Paolo, visible 12 miles. (See Light List.)

The shore of Mar Grande from Punta Rondinella trends eastward $1\frac{1}{4}$ miles to the mole of Porto Mercantile. A small pier for boats extends from the shore about 800 yards eastward of Rondinella Point.

Isolotto San Nicolichio, near the shore, $\frac{1}{2}$ mile eastward of Punta Rondinella, is small, and not noticeable.

The shore from Porto Mercantile curves southward and southwestward about 6 miles to Cape San Vito.

Cape San Vito (lat. $40^{\circ} 25' N.$, long. $17^{\circ} 12' E.$) is low; there is a square tower on it.

Light.—A fixed and flashing light is exhibited, at 150 feet above high water, from an octagonal tower on a white house, 140 feet high, on Cape San Vito. Visible 19 miles. (See Light List.)

Signal station.—There is a semaphore, 46 feet above high water, westward of the lighthouse on Cape San Vito. It is open both by day and at night.

Secca San Vito extends west-northwestward about 1 mile from the coast, $\frac{3}{4}$ mile northwestward of Cape San Vito Lighthouse.

Beacon.—An iron truncated pyramidal beacon stands on the western end of Secca San Vito. A flashing green light is exhibited from the beacon.

Barrier—Caution.—A mole, about 3 feet under water, extends along Secca San Vito between the coast and the beacon; there is no passage over it.

The entrance to Mar Grande, between Isola San Paolo and the beacon on the western end of Secca San Vito, is about $\frac{3}{4}$ mile wide, with depths of from 5 to 20 fathoms.

Depths.—The depths in Mar Grande decrease from about 20 fathoms in the middle of the entrance to about 12 fathoms near the town.

The north and northwestern sides of the anchorage are shallow, there being 4 and $4\frac{1}{2}$ fathoms in the greater portion of the space westward of a line drawn from the eastern end of Isola San Paolo to the eastern end of Isolotto San Nicolicchio.

Banco della Sirena, 1,800 yards south-southeastward from Isolotto San Nicolicchio, is 700 yards long north and south, and 300 yards broad, within the 5-fathom curve, and has a least depth of $3\frac{3}{4}$ fathoms.

Buoys.—A cylindrical buoy, surmounted by an openwork cylinder and painted black and white in horizontal stripes, is moored in 7 fathoms water on the southern side of the bank. Two calibrating buoys lie about 700 yards westward of the bank.

Secca della Tarantola, nearly $1\frac{1}{4}$ miles southeastward from Banco della Sirena, is 700 yards long north and south and 300 yards broad, with $1\frac{1}{4}$ fathoms least water; generally southward of a line between the beacon on the western end of Secca San Vito and the southern part of Secca della Tarantola there are depths of less than 5 fathoms, with shoaler water in places; the northern and eastern sides of Secca della Tarantola are steep-to.

Lights.—An occulting red light is exhibited from an iron pyramid, painted with white stripes, on a framework, 34 feet high, in 2 fathoms water near the northern end of Secca della Tarantola.

A fixed white light is exhibited, at 50 feet above high water, from a masonry beacon, surmounted by an iron staff with a flag, 38 feet high, on the beach on the south shore of Mar Grande about 1 mile northeastward of Cape San Vito lighthouse.

These beacons in range 193° lead through the middle of Passagio Piccolo. (For detail, see Light List.)

Buoy.—A buoy, surmounted by an iron staff carrying a metal flag, is moored 100 yards northward of the beacon on Secca della Tarantola.

Pier.—A small pier for the use of tugs extends nearly 300 yards northeastward from the shore about 300 yards eastward of the light-beacon on the southern shore of Mar Grande. There are depths of 6 feet at a distance of 400 yards northeastward of the pier.

Pilotage.—It is optional for vessels to take a pilot when entering or leaving Mar Grande. The pilots board arriving vessels at a distance not less than 3 miles from Cape San Vito lighthouse and take outgoing vessels to the southwestward of a line between San Paolo and San Vito lighthouses.

Directions.—In entering Mar Grande, pass between Isola San Paolo and the beacon on the western end of Secca San Vito, giving a berth of 400 yards to the island, and then steer direct to the anchorage.

Anchorage.—Merchant vessels anchor between lines joining Isola San Paolo and Castel Sant' Angelo, and Isola San Paolo and Isolotto San Nicolicchio.

Naval vessels anchor between a line joining Isola San Paolo and Castel Sant' Angelo, and the alignment of the axis of the canal, leaving the approach to the canal clear, and between Secca della Tarantola and the town, in from 12 to 16 fathoms water; westward of the town, and in less than 12 fathoms water, are several patches of rocky ground.

Prohibited anchorage.—Anchorage is prohibited between lines from Punta Rondinella Point to Lo Scanno; from the southern point of Isola San Pietro to the southern point of Isola San Paolo; and from the eastern point of Isola San Paolo to the eastern point of Isolotto San Nicolicchio. Also between lines from the southern point of Isola San Paolo to the light-beacon on the beach northeastward of Cape San Vito; from that beacon to the light-beacon on Secca della Tarantola; and from this beacon to the southern point of Isola San Pietro.

Porto Mercantile, northwestward of the town of Taranto, is protected by a mole which extends about 500 yards southward from the coast 600 yards westward of the town; the entrance between the outer end of the mole and Batteria Carducci at the western extremity of the town, is about 400 yards wide, with a depth of $3\frac{1}{2}$ fathoms,

and the port has been dredged to a depth of 3 fathoms; there are berths for one vessel of moderate size and one small vessel alongside the quay.

A mole is being constructed which will extend 240 yards south-westward from the southern side of Battria Carducci.

The customhouse and the railroad station are situated in Borgo della Stazione, on the northern shore of the port; the health office is at Batteria Carducci.

Lights.—An occulting red light is exhibited, at 31 feet above high water, from a metal yard on an iron hut, 28 feet high, on the head of the western mole of Porto Mercantile.

A fixed green light is exhibited, at 21 feet above high water, from a post on the head of the eastern mole of Porto Mercantile, in course of construction.

Buoys.—A bottle-shaped buoy is moored 312 yards 8° from the occulting red light on the west mole.

A cylindrical buoy is moored 403 yards 42° from the same light.

NOTE.—These buoys are maintained for the Royal Marine.

A bottle-shaped buoy is moored 409 yards $28^{\circ} 30'$, a float buoy 470 yards 40° , a bottle-shaped buoy 749 yards 48° from the same light.

There are also three float buoys near the head of the east mole for the construction barges.

The town of Taranto (ancient Tarentum) stands at the head of Mar Grande, the old part being on an island situated between Mar Grande and Mar Piccolo.

The houses in the old town are of many stories, and close together with narrow, tortuous streets, except one, which leads from Ponte Napoli, the masonry bridge at the northwest end of the town, to the swing bridge at the southeastern end. The campanile of the cathedral (San Cataldo) rises above the other buildings in the old town; Castel Sant' Angelo, at the southern end of the town, is conspicuous, and dominated by a watch station and a large cylindrical iron reservoir. Borgo Nuovo, the new part of the town, extends eastward from the canal at the southeastern end of the town, and has many large buildings with wide streets. The population was 70,381 in 1911.

Trade.—Taranto has manufactories of linen and cotton; the exports in 1913 included licorice, dried figs, and tinned tomatoes, and the imports iron, timber, cereals, coal, petroleum, cement, phosphates, and sugar.

Supplies.—Provisions can be obtained. Water is brought from a considerable distance by an aqueduct which passes over Ponte Napoli. Merchant vessels can obtain water free at a fountain near the southern end of the bridge, and it is sent off to vessels at the anchorage in naval tank boats, and pumped on board at about 60 cents per ton.

Coal may be obtained, but a supply can not be depended on. It is put on board from lighters by baskets, and 50 tons might be loaded hourly; there are numerous lighters of from 10 to 15 tons.

Time signals.—Two black cones, points together, are hoisted five minutes before the signal, at a signal staff on Castel Sant' Angelo, and dropped at noon, standard time, or 23h. 00m. 00s., Greenwich mean time.

Should the signal fail or be inaccurate the cones will be hoisted halfway up $4\frac{1}{2}$ minutes, and lowered 15 minutes, after the time of the signal; the signal will then be made at 1h. 00m. 00s., standard time. Should the signal again fail, the cones will be hoisted halfway up and lowered, as before, but no further signal will be made.

On festival days the cones are replaced by flag F, and the signal is made by hand.

A similar signal is made at the same time from a signal staff on the large building of the Direzione dell' Arsenal.

A gun at Castel Sant' Angelo is fired at noon, standard time, by the same electric current which causes the cones to drop, except on festival days, when it is fired by hand.

Hospitals.—There is, at Taranto, a large and important naval hospital, and also a civil hospital, with about 100 beds, of which 20 to 25 are available for sick cases on payment of 30 cents daily for medical, and 40 cents for surgical, cases; it is necessary to pay for one month in advance, but on discharge the amount for the time not spent in hospital is returned.

Communication.—There is communication by steamers with Marseille, Genoa, Palermo, Brindisi, and Venice. There is railroad communication with Naples, Reggio, Bari, Brindisi, Gallipoli, and Otranto.

Mar Piccolo extends about $4\frac{1}{2}$ miles eastward of the town, with a breadth of nearly 2 miles, and is divided into two basins of unequal size by the peninsula terminating in Penna Point, which projects about $1\frac{1}{2}$ miles southward from the north shore. The depth in the western basin is, generally, from 6 to 7 fathoms, and in the eastern basin from $3\frac{1}{2}$ to 5 fathoms; the shores, excepting in the vicinity of the arsenal, are bordered by banks with from 3 to 6 feet water, on which are large oyster grounds.

Canals.—Mar Grande communicates with Mar Piccolo by two canals; the canal northwestward of the town is very shallow, and crossed by Ponte Napoli, of masonry arches on pillars. Passaggio Piccolo (Canale dei due Mari), on the southeastern side of the old town, is crossed by a swing bridge, 40 feet above the mean level of the sea in the middle; the canal is 400 yards long, 80 yards wide between the shores, and 64 yards wide between the pillars of the bridge, with a depth of $6\frac{1}{2}$ fathoms in the middle.

Range lights.—The range lights on Secca della Tarantola and the southern shore of Mar Grande, are described in Light List.

An occulting red light is exhibited from an iron pyramid painted with white stripes, on a framework 34 feet high, situated in $5\frac{1}{2}$ fathoms water in the western basin of Mar Piccolo, about 1,700 yards northward of the canal entrance.

A fixed white light is exhibited, at 71 feet above high water, from a masonry pillar on a rectangular base, 32 feet high, and painted black and white in vertical stripes, the upper part black, and surmounted by a staff with a flag, on the northwestern shore of Mar Piccolo, near Casa Troilo.

These lights in range, 13° , lead through the middle of the canal.

Lights.—When a vessel is going to pass through the canal at night it is lighted by six electric arc lights, two on the central faces of the pillars which support the bridge, and one on each side of both entrances, but for local vessels it is lighted by eight incandescent electric lights.

Tidal streams.—The tidal streams are fairly strong in the canal, and when passing through with the stream keep the vessel exactly in the middle, as there appear to be strong eddies near the pillars of the bridge. The signal station at Castel Sant' Angelo will hoist, by day, flag F while the stream is running northward through the canal and flag C while it is running southward.

Signals and rules.—Passagio Piccolo is reserved exclusively for military purposes; no traffic is allowed on its quays and it is used by Italian naval vessels or merchant vessels carrying Government stores, but under certain circumstances the naval commandant can permit other vessels to pass through.

Foreign naval vessels must obtain ministerial sanction to enter, but in case of emergency this may be dispensed with.

The bridge across the canal will be opened for Italian naval vessels by signal during the times specified below, but in other cases the sanction of the naval commandant is necessary.

From 7.55 a. m. to 8.20 a. m., 9.05 a. m. to 10.05 a. m., 10.55 a. m. to 1.10 p. m., 1.55 p. m. to 3 p. m., 4.05 p. m. to 5.25 p. m., 6.05 p. m. to 7.05 p. m., 8 p. m. to 9 p. m., and 10.15 p. m. to 3.45 a. m.

From 5.25 p. m. to 7.55 a. m. a request to open the bridge must be sent to the naval commandant.

Vessels about to pass through the canal must hoist the signal J. F. R. (open the bridge). A black ball hoisted at the signal station indicates that preparations are being made for opening the bridge, if the request has been made during the hours specified in the time table.

While the bridge is being opened the black ball is lowered to half-mast, and when the passage is clear it will be lowered and flag H

hoisted at the yardarm at the signal station. Should any accident prevent the bridge from being opened the ball will be rehoisted at the signal station, and, if necessary, the duration of the interruption signaled by international code.

If the request is made while the bridge usually remains closed, the time at which it can be opened will be indicated by international code.

A cylinder hoisted at the signal station indicates that the canal is clear for vessels entering Mar Piccolo and a pyramid that it is clear for vessels leaving Mar Piccolo.

When two vessels request that the bridge may be opened at the same time, one from Mar Piccolo and the other from Mar Grande, the outgoing vessel will pass through first and then the other will enter.

The flagship in Mar Grande will communicate by signal with vessels desiring to leave Mar Piccolo.

Craft entering Mar Piccolo from Mar Grande should navigate at a short distance from the western bank of the canal; those going from Mar Piccolo to Mar Grande should navigate at a short distance from the eastern bank.

No craft navigating the canal, or the vicinity of its entrances, may pass another ahead.

Large vessels passing through the canal should proceed at a rate of 6 knots; a rate of 8 knots must not be exceeded.

Motor craft should go at a moderate speed in the canal.

At night, when the passage is clear, a rocket, showing green, red, green, white sprays, will be fired.

Dockyard.—The naval dockyard and arsenal are situated eastward of Borgo Nuovo on the southern shore of Mar Piccolo.

A mole extends about 100 yards northward from the shore 800 yards eastward of the entrance to the canal, and a mole extends 200 yards eastward from a point 600 yards farther eastward; this mole forms the northern side of a port in which there are $5\frac{1}{2}$ fathoms water, and at the head of which are the docks and principal workshops, with a 160-ton crane.

Lights are exhibited from the heads of the moles just mentioned.

A square beacon of wooden piles, surmounted by a staff and globe, stands on the extremity of the bank southward of Penna Point, and a light is exhibited from it. A square beacon of wooden piles stands on the extremity of the spit eastward of the point.

A light is exhibited from the western of two piers at Buffoluto, on the west shore of the eastern basin. (See Light List.)

Buoys.—A yellow cylindrical mooring buoy, for the stern fast of the flagship lies a little northeastward of the inner eastern entrance

point of the canal. Two small mooring buoys for tugs lie north-westward of the canal entrance.

Fifteen mooring buoys, marked I to XV, lie in the western basin of Mar Piccolo.

A green warping buoy is moored near the coal wharf, eastward of the mole extending northward from the south shore.

Five buoys for adjusting compasses are moored in the northern part of the western basin.

Five mooring buoys lie off the dockyard port.

Two mooring buoys lie off Buffoluto.

A central buoy, with four piles around, is placed in the eastern part of the eastern basin for adjusting compasses.

Pilotage is compulsory for merchant vessels authorized to enter or leave Mar Piccolo. Sailing vessels should be towed through the canal. The captain of a merchant vessel entering Mar Piccolo must request a pilot from the captain of the port, who will inform him of the time when he should be ready to move.

Anchorage.—Merchant vessels anchor in Mar Piccolo, westward of the line of the canal.

Springs of fresh water.—There are some springs of fresh water, which rises from the bottom, in both Mar Grande and Mar Piccolo. The principal one in Mar Grande lies off the entrance to Porto Mercantile; the water rises from this spring with force and forms whirls at the surface, so that the position is marked when the sea is smooth. In Mar Piccolo the principal springs are in the northern part of the western basin and in the eastern part of the eastern basin.

Caution.—Oysters and other shellfish are extensively reared in Mar Piccolo and exported to Naples. Serious cases of illness have occurred through eating them when out of season.

Winds.—In winter, northwest to northeast and southeast winds prevail. Northeasterly winds blow sometimes with great violence and render communication with the shore difficult, even in Mar Piccolo. Generally, northerly winds last several days; they decrease or become calm during night and the early hours of the morning, but blow with violence during the rest of the day. Southwesterly winds send a considerable sea into Mar Grande, and generally raise the level of the water. Southeasterly winds, especially in winter, blow violently and are troublesome in Porto Mercantile, but do not raise a heavy sea in Mar Grande; they are accompanied by rain and thick weather, especially in May and June, and veer to southwest and west. In spring Taranto is subject to strong westerly winds, called *cosiddetti*, which are of short duration and cease at sunset.

Northeasterly winds are indicated by a belt of clouds which forms on the hills northward of Mar Piccolo, and remains while the winds last, generally for some days, the Calabrian coast being clear. South-

easterly winds are indicated by a sensible rise in the level of the water.

Currents.—The currents off Mar Grande set westward; they are usually weak and only felt during strong easterly winds.

The coast from Cape San Vito (lat. $40^{\circ} 25' N.$, long. $17^{\circ} 12' E.$) trends east-southeastward 15 miles to Cape dell' Ovo, and is generally low, rocky, and much browned; a bank with $2\frac{1}{2}$ fathoms water lies about 700 yards off the coast $\frac{3}{4}$ mile eastward of Cape San Vito, and a bank with $3\frac{1}{2}$ fathoms water, about 800 yards off the coast, 1 mile farther southeastward.

The hills of Roccaforzata attain a height of 1,463 feet about 8 miles eastward of Cape San Vito. There are towers on most of the points and small coves suitable for boats and coasting vessels along the coast. Porto Tramontana (Porto Jannole), the largest of these, is about $4\frac{1}{2}$ miles from Cape San Vito. Leporano village, about $1\frac{1}{2}$ miles eastward of Porto Tramontana, is 157 feet above high water, and has a castle with a pillar on it.

Torre Castelluccia (Castelluccio), on the coast, $4\frac{1}{2}$ miles southeastward of Porto Tramontana, is 72 feet high, painted black and white in horizontal stripes, and surmounted by a pillar.

Torre Sassoli, on the coast, about 1 mile southeastward of Torre Castelluccia and situated on a flat and rocky point, is low. Between this tower and Cape dell' Ovo a bank, with shoal water in places, extends about $\frac{1}{2}$ mile off the coast.

Fragagnano Village, about 7 miles north-northeastward of Torre Sassoli, shows a large white cupola behind a large dark stone building. Lizzano, nearly midway between the tower and Fragagnano, has white houses.

Measured distance.—A distance of 19,369 feet has been measured southeastward of Cape San Vito. The running line is Torre San Vito in range with Isola San Paolo Lighthouse, bearing 323° ; the western limit is a pillar on the tower of Castello di Leporano in range with a pillar on Castello di Roccaforzata; and the eastern limit is the middle of Torre Castelluccia in range with a pillar on the campanile of Fragagnano Church. The depths on the course are from 124 to 147 fathoms.

Cape dell' Ovo is low, sandy, and wooded; Torre dell' Ovo, on the cape, is 33 feet high and surmounted by a white house and flagstaff. A low rock, about 200 yards long, extends southwestward from near the coast about 600 yards northwestward of the tower.

Secca Torre dell' Ovo, with $3\frac{1}{2}$ fathoms water, lies about 2.4 miles southeastward of the tower, and is the southern part of a shoal bank extending from the cape.

The coast from Cape dell' Ovo (lat. $40^{\circ} 18' N.$, long. $17^{\circ} 31' E.$) trends eastward 15 miles to Torre Lapilla, and is generally low and

rocky with some short sandy beaches, and bordered by a rocky bank which extends off about $\frac{1}{2}$ mile. Several towers, almost all square, stand on the coast; the climate generally is unhealthful.

Anchorage.—There is anchorage during fine weather off Torre dei Molini, 2 miles eastward of Cape dell' Ovo, the air here being less bad than elsewhere in the locality. Fishing vessels anchor eastward of Torre Colimena, which is situated on a small point about 8 miles eastward of Torre dei Molini.

The coast southeastward of Torre Lapilla, which is near the sea, forms three contiguous bights. Porto Lapillo, the first, situated between Torre Lapilla and Torre Chianca, affords moderate shelter for small vessels in depths of from $1\frac{1}{2}$ to 2 fathoms, but the holding ground is bad, and it is seldom visited. The central bight is not available for vessels.

Porto Cesareo (lat. $40^{\circ} 15' N.$, long. $17^{\circ} 54' E.$), the third bight, lies between Torre Cesareo (Cesarea) and Torre Pianuri or Squillace. From near the last tower a low tongue of land, called La Strega, extends northwestward and protects the water inside it as well as making Porto Cesareo a safe anchorage for small vessels, with winds from any direction. Scoglio Capparone lies at the north end of La Strega; it is low and flat and is left about 100 yards to the southward when entering. The port is marked by the conspicuous white building, 92 feet above high water, of La Salmenta farm and by Torre Cesareo, which is square, and surrounded by groups of low, white houses. The depths in the port, the entrance to which is very narrow, are from about 1 to 2 fathoms, except in the southeastern part, which is filled with sand. The sea breaks at the entrance to the port with southwesterly winds.

The islets, which lie northwestward of the port, are bordered by rocks on their south and southwestern sides.

Range lights.—A fixed red light is exhibited, at 11 feet above high water, from a masonry hut, 13 feet high, and painted white with a red vertical stripe, nearly 800 yards eastward of Torre Cesareo.

A fixed red light is exhibited at 43 feet above high water from a masonry column, 13 feet high, and painted white with a red vertical stripe, situated 853 yards 34° from the preceding light.

The red stripes by day, and the lights at night, in line, lead into the port. (See Light List.)

The coast from Porto Cesareo trends southward $12\frac{1}{2}$ miles to Gallipoli, and is rocky and sandy at intervals, rising to wooded land of moderate height. There are several coves on the coast, but none of any importance.

Tunny fishery.—Tunny nets are laid out about 1 mile westward, with a width of 300 yards, from near Torre Pianuri, about $1\frac{1}{4}$ miles

southeastward of the entrance to Porto Cesareo. The nets are marked by a boat with a mast surmounted by a cone by day and by two lights placed vertically, the upper white and the lower green, at night.

The coast.—Torre Inserraglio, $3\frac{1}{4}$ miles southward of Torre Pianuri, appears white from seaward. Seno di Santa Caterina, 8 miles south-southeastward of Porto Cesareo, affords anchorage in 3 fathoms water, sand bottom, sheltered from winds from northwest, through north, to east-southeast.

Madonna dell' Alto, a group of houses on a little hill, 246 feet high, northward of the bight; Torre Santa Caterina, and the houses at the head of the bight, are good marks. A rock, with 6 feet water, lies near the northern point of the bight.

Nardò, a large village, lies 3 miles northeastward of Santa Caterina, and there is a good road between them.

Santa Maria del Bagno is the bight immediately southward of Santa Caterina, and at its head is a village, much frequented for bathing in summer. Anchorage can be obtained in about $4\frac{1}{2}$ fathoms, sand, in the middle of the bight, and just within the line joining the entrance points.

Torre Fiume, called locally Torre a quattro colonne, behind Bagno bight, is noticeable, and about 1 mile from it is Torre d'Alto Lido, 230 feet above high water, and erected on a rough and relatively high rocky cliff.

Small vessels can obtain shelter from strong offshore winds anywhere off this coast, near the 5-fathom curve, but it is better to avoid doing so, especially near Torre Sabea, about $3\frac{1}{2}$ miles southward of Santa Caterina, on account of the malaria.

Gallipoli (ancient Callipolis), an old walled town, is situated on a rocky island 600 yards in extent, connected to the mainland by a long stone bridge. An old castle lies in the eastern part of the old town, and eastward of the bridge is the Borgo, the new part of the town. The population was 11,460 in 1911.

Porto.—The port, open to the eastward, is protected by a detached mole, which extends 335 yards east-northeastward, its southwestern end being connected by a bridge, 77 yards long, to the northern extremity of the island, on which is the town. Quays extend along the north coast of the island, but the depths in the port decrease from $6\frac{1}{2}$ fathoms near the molehead to $1\frac{1}{2}$ fathoms and less near the quays. Steamers in the port generally moor head to north-northeast, with a stern hawser to the shore.

Works are in progress for extending the mole, and are marked by buoys and two red piles projecting above water. A buoy with a wooden superstructure and surmounted by a red metal flag is moored

about 165 yards east-northeastward from the lighthouse on the end of the mole, and marks the extremity of the works.

Secca del Rafo, about 400 yards northward from the head of the mole, is a little more than 100 yards in extent, with $1\frac{1}{2}$ fathoms water, rock bottom.

Lights.—A fixed green light is exhibited, at 36 feet above high water, from a circular white tower, 32 feet high, on the eastern end of the mole, visible 11 miles.

An occulting red light is exhibited, at 32 feet above high water, from an iron framework beacon on the southern end of Secca del Rafo. Visible 5 miles. (See Light List.)

Scogli Campo and Piccioni, 13 feet high, together with some smaller rocks, lie from 200 to 300 yards westward and southwestward of Gallipoli, on the outer extreme of an extensive bank. The passage inside the rocks is only practicable by small boats.

Isola di Sant' Andrea, 1,200 yards west-southwestward of Scoglio Campo (lat. $40^{\circ} 3' N.$, long. $17^{\circ} 59' E.$), is about $\frac{1}{2}$ mile in extent and so low that with strong southeasterly winds the seas completely invade it. It is surrounded by a shoal bank which extends over 100 yards off in places. A reef, named Rafo di Sant' Andrea, with $1\frac{1}{2}$ fathoms least water, lies 100 yards off the southeast coast of the island.

The passage between Scogli Campo and Piccioni and Isola Sant' Andrea is nearly 1,200 yards wide, with from 7 to 8 fathoms water, and quite clear.

Light.—A fixed and flashing white light is exhibited, at 149 feet above high water, from a white octagonal tower on a white, two-storied house, 141 feet high, on the southwestern extremity of Isola Sant' Andrea.

Signals for assistance are made from the lighthouse. The light is visible 18 miles. (See Light List.)

Tunny fishery.—Tunny nets extend 2,300 yards northwestward, with a breadth of 550 yards, from the coast nearly $\frac{1}{2}$ mile eastward of the Port office; the nets are marked by a boat with a mast surmounted by a cone, and a white light at night.

Anchorage.—The anchorages of Gallipoli northward and southward of the town, are useful for vessels of any size, caught by bad weather in Taranto Gulf. The anchorage northward of the town is sheltered except from northwesterly and westerly winds, which send in a heavy sea; a good berth is with the Port office, which is an isolated building at the eastern end of the bridge between Gallipoli and Borgo, bearing 180° , and the mole lighthouse in range with the northwestern extremity of Scoglio Campo, in $7\frac{1}{2}$ fathoms water; toward the shore the holding ground is bad. There is anchorage with northerly winds in the bay, named Canneto, southward of the town;

anchor with the Port office bearing 0° , when some white houses will be in range with it, and the northeastern extremity of Scoglio Campo in range with the southwestern extremity of the town, in 9 fathoms water, sand.

Winds.—Northerly, northeasterly, and southeasterly winds prevail, the last being accompanied by a heavy sea. Southerly winds are indicated by a long swell from the southward, which commences during a calm or northerly winds.

Currents.—The currents depend on the winds.

Trade.—The principal products of Gallipoli are oil and wine. The chief imports are petroleum, pulse and rice, and timber, and the exports figs, olive oil, and timber.

Supplies.—Fresh provisions can be procured, but there is no coal. Water can be obtained from a fountain, with several jets, southward of the Port office, using barrels.

Communication.—Gallipoli is the terminus of the Brindisi & Gallipoli Railroad; steamers run to Genoa, Palermo, Brindisi, and Venice; also to Taranto and Marseille.

The coast, between Gallipoli and Punta Pizzo, $3\frac{1}{4}$ miles to the southward, is a sandy bay; on its northeastern shore is Torre San Giovanni.

Punta Pizzo, on which is a circular tower, advances decidedly northwestward; it is rocky and a spit extends a short distance northwestward from it, the 5-fathom curve being $\frac{1}{2}$ mile from the point. Small vessels shelter from southerly winds northeastward of the point.

The coast from Punta Pizzo trends southeastward 21 miles at Cape Santa Maria di Leuca; from the point to Scoglio Pozza (Pazzi), a distance of 8 miles, the land is moderately high and the coast rocky; Scoglio Pozza is above water, and 200 yards off-shore.

Torre Suda, on the coast $3\frac{1}{4}$ miles southeastward of Punta Pizzo, is 30 feet above high water, and white; there is a group of houses a short distance northward of it. Torre Sonfino (Sinfono), about $2\frac{1}{2}$ miles farther southeastward, is 30 feet above high water.

The coast from abreast Scoglio Pozza is low and sandy 1 mile to a rocky point surmounted by Torre San Giovanni, which is large, with its upper part white. About 300 yards southeastward of the tower, a line of rocks commences and extends about 1,200 yards about 200 yards off the coast; from seaward it shows seven rocks, the largest of which is named Scoglio Tondo from its rounded top. A good road leads from Torre San Giovanni to Ugento, a village $3\frac{1}{4}$ miles northeastward, and 354 feet above high water, which is conspicuous from seaward.

The coast from Torre San Giovanni rises in sandy hillocks southeastward to Torre Mozza, distant 3 miles, which is slightly conical

and isolated; it then becomes higher and rocky to Cape Santa Maria di Leuca.

Secche di Ugento.—A bank of foul ground extends off the coast between Torre San Giovanni and Torre Pali, $5\frac{1}{2}$ miles southeastward, and it reaches a distance of 2 miles south-southwestward of Torre Mozza, terminating in two large rocks awash, named Giumenta and Cavallo, and forming altogether Secche di Ugento.

Secca Palombaro, with 2 feet water, lies on the bank about 1 mile southwestward of Torre Mozza. La Giurlita is a rock above water, about $\frac{1}{2}$ mile northwestward of Secca Palombaro; over other parts of the shoal are depths of from $1\frac{1}{2}$ to $3\frac{1}{2}$ fathoms. The 20-fathom curve is about 6 miles southwestward from Torre Mozza.

Light buoy.—A red cylindrical iron light buoy, surmounted by a staff, moored near the southern extremity of Secche di Ugento, and exhibits a flashing white light. (See Light List.)

Clearing marks.—Isola Sant' Andrea Lighthouse well open westward of the coast to the southward, or Torre Pizzo, open westward of Torre Suda, about 332° , leads westward, and Salve Village open southward of Torre Pali, about 68° , leads southward of Secche di Ugento.

At night the lights of Isola Sant' Andrea and Cape Santa Maria di Leuca are obscured over the bank, but it is stated that the lights have been seen from the bank, therefore these obscurations must not be trusted, and vessels must verify their positions by bearings of the lights.

In thick weather the bank should not be approached to less than 16 fathoms water.

The coast.—Torre Pali is on the southeastern end of a rocky tongue of land, with a white square house westward of it.

Scoglio la Fanciulla, westward of the tongue of land just mentioned, is low, broken, and dark in color.

Torre Vado, $3\frac{1}{2}$ miles eastward of Torre Pali and near the beach, is cylindrical, and there are seven or eight houses behind it. A bank, with from 1 to 2 fathoms water, extends $\frac{1}{2}$ mile off the coast between Torre Vado and Pali; its outer edge is steep-to.

The coast from Torre Vado trends southeastward 4 miles to Ristola Point.

Torre San Gregorio, about 2 miles from Torre Vado and on a hill 108 feet high, is of the same color as the coast, and there is a small white house southeastward of it. The tower is not conspicuous, and at the distance of a few miles is difficult to distinguish.

A rock, almost awash, lies near the southern point of the little promontory on which is the tower.

Ristola Point (lat. $39^\circ 47'$ N., long. $18^\circ 21'$ E.) is the extremity of a small peninsula, which projects about 200 yards southward

from the coast. Banco la Scala, with from 6 to 13 fathoms water, rock bottom, extends about $1\frac{1}{2}$ miles south-southeastward from the point, and a short distance off Cape Santa Maria di Leuca. It is frequented by fishing boats.

Anchorage.—The anchorage of Santa Maria di Leuca is in the small bay lying between Ristola Point and Meliso Point, nearly 1 mile to the eastward and about 200 yards westward of Cape Santa Maria di Leuca. The anchorage is safe with winds from northwest to northeast and is frequented by vessels which, owing to strong northerly winds, are unable to enter the Adriatic. It is necessary to keep ready to leave on the first indication of southerly winds. The best position is midway between the entrance points and off Casine di Leuca, in about 8 fathoms water, sand bottom. When a strong bora (northerly wind) is blowing, the squalls in the anchorage are very violent, and a vessel should have a long scope of chain out.

CHAPTER III.

CAPE SANTA MARIA DI LEUCA TO TRONTO RIVER.

Western shore of the Adriatic.—Between Cape Santa Maria di Leuca and the Tronto River, the western shore of the Adriatic Sea, except the easternmost portion and the high peninsula known as Gargano Head, is generally low, but of easy navigation in the summer season.

Cape Santa Maria di Leuca (ancient Salentinum prom.), the heel of what is called the “boot” of Italy, is the eastern point of the Gulf of Taranto and the western extremity of entrance to the Adriatic. Its summit is about 460 feet high, whence it slopes to the sea, and is well marked by the lighthouse and the sanctuary of Santa Maria di Leuca, a large house northward of the lighthouse. At times it is enveloped in dense clouds, and a vessel bound northward in the Adriatic not being able to make the cape should approach and sight the high land of Cape Linguetta, on the coast of Albania.

Light.—A fixed and flashing light visible 25 miles, is exhibited at 335 feet above high water, from a white octagonal tower on a white two-storied house, 159 feet high, on the cape. (See Light List.)

Signal station.—There is a semaphore at La Guardia, about 1½ miles northwestward of the lighthouse, the tower of which is 384 feet above high water, and painted black and white in checkers.

Currents.—The inshore currents around the cape are variable; the offshore current generally sets southward along the western shore of the Adriatic and sometimes turns westward around the cape. This current may set on Secche di Ugento and should be guarded against.

The coast between Cape Santa Maria di Leuca and Cape Otranto, 21° 20 miles from it, consists chiefly of well cultivated rocky elevations on which are numerous villages and towers; of the former, Gagliano, 3 miles from Cape Santa Maria, is conspicuous. The shore is almost everywhere bold with soundings from 11 to 17 fathoms close to which increase to 36 and 54 fathoms near Cape Santa Maria di Leuca. The small Bay of Castro is the only anchorage along it which affords even temporary shelter and is easily distinguished by the town from which it takes its name; as, however,

the southerly current is usually strong in this vicinity, a vessel should not close this part of the coast except when leaving the Adriatic with a commanding breeze.

The numerous towers erected at intervals for defense in former times are convenient guides for coasting vessels; the most conspicuous of these are, the semaphore, northwestward of Santa Maria di Leuca Lighthouse, already described; Novaglie Tower in ruins, and the towers of Specchia grande, Port Tricase, Sasso, and Andrano, the last-named being 10 miles from the lighthouse.

Port Tricase is indicated by some houses on the beach and is accessible to boats only.

Sasso Tower is about 1 mile northward of Tricase and on a height above it is the tower of the abbey of Santa Maria di Mito.

Port Castro.—Mugurone or Maccarone Point, about $12\frac{1}{2}$ miles northward of Cape Santa Maria di Leuca, is steep and rocky, and projecting southeastward, forms the port of Castro; the town stands about 320 feet above the sea and 700 yards northward of the point; the anchorage is sheltered from northerly and westerly winds, but much exposed to those from east or southeast. Vessels anchor about $\frac{1}{2}$ mile southwestward of Mugurone Point in a depth of 8 fathoms, mud and weeds; the town bearing about 4° . The anchorage is used by vessels in the fine season when unable to work into the Adriatic against the current during long continued northwesterly winds.

Water may be obtained about 1 mile southwestward of the anchorage at a narrow stream which flows into the Cala dell' Acquaviva, or fresh-water creek.

Port Badisco is a small and narrow inlet about $5\frac{1}{2}$ miles northward of Castro; between them, at 2 miles from Castro, is the tower and port of Miggiano. Port Badisco has only sufficient space to shelter a few vessels of light draft, moored head and stern, from westerly and northerly winds.

The inlet trends northwestward and is in some measure sheltered from on-shore winds, but exposed to those from the southeastward, which cause a considerable sea. The place may be known by St. Emiliano Tower, which stands on the coast about $\frac{3}{4}$ mile northward of it; near the tower are two or three rocks above water.

Cape Otranto, about $2\frac{1}{2}$ miles northeastward of Badisco, is the eastern extremity of a mass of high precipitous table-land, the frontage of which is $1\frac{1}{2}$ miles in extent; on the cape stands the tower of Palascia, and near the extremity is the lighthouse rising from the keeper's dwelling, which is square. Orto Point, the northern extremity of the highland, has on it a tower in a ruinous condition; southward of it may be seen the buildings of S. Nicola di Casole, and northward of it is the tower of Cucurizzo and the Town of Otranto. Just southward of Orto Point is Posta della Fasci, pro-

jecting more eastward and forming on its southern side a bay about $\frac{1}{2}$ mile deep, the shore of which is skirted by rocks above water; rocky ground at a depth of 3 to 5 fathoms extends off nearly 650 yards. Southward of the rocky ground and a short $\frac{1}{2}$ mile from the point southward of Posta della Fasci, there is anchorage with off-shore winds in a depth of 5 or 6 fathoms, sand and shells; the shoal water is steep-to, there being 25 fathoms near it.

Light.—Near the extremity of Cape Otranto stands a circular white tower above a two-story dwelling, from which at an elevation of 105 feet above the sea is exhibited a group flashing white light, visible 15 miles. (See Light List.)

Semaphore—Storm signals.—About 500 yards northwestward of the cape, near Palascia Tower, is a semaphore and electric telegraph station from which storm signals are exhibited.

Port Otranto (ancient Hydruntum), nearly 3 miles northwestward of the cape, is a bay about 800 yards wide formed between St. Nicola Point on the southeast and Craul Point, which is low and rocky, on the northwest. St. Nicola Point, the inner portion of which is rather high, terminates in a chain of rocks awash which afford some protection to the port against easterly winds. Le Secche, a sand bank with several rocks awash, lies about 250 yards northwestward of the rocks off St. Nicola Point, and contributes to the protection of the anchorage from northerly winds; between the two is a passage with a depth of $3\frac{1}{2}$ fathoms.

The Town of Otranto contains a population of about 2,000 and is now of little importance. It stands on a rocky site on the southern side of the bay, protected by surrounding walls and a castle. Very little trade is carried on, the only export being agricultural produce; coasting vessels are, however, constructed on the beach, and it is the terminus of the railroad system communicating through Brindisi with the rest of Italy. Small supplies are plentiful, and spring water can be obtained at the northwestern bastion outside the town.

The anchorage of Otranto (for small vessels only) lies between St. Nicola Point, the Secche, and the town, in $3\frac{1}{2}$ fathoms, weed and bad holding ground; the bottom is rocky on the northeastern and southwestern sides. Northeasterly and easterly winds send in a considerable sea, but the shelter with the wind from north, round by west, to southeast is very good. Vessels not wishing to enter the port may anchor in depths of from 6 to 10 fathoms outside the Secche.

Light.—On Craul Point, from an iron support over a sentry box, at an elevation of 33 feet above the sea, a fixed white light with red sector is exhibited; visible 8 miles. (For limits of sector see Chart and Light List.)

Shoal.—In the passage between Le Secche and the rocks off St. Nicola Point is a shoal with 3 feet water, located 682 yards 152° from Craul Point Light.

Telegraph cables.—There are three telegraph cables from the shore southeastward of the port near Orto Point; one to Valona, on the opposite coast of the Adriatic; a second to Sidari at the northern end of the Island of Corfu; and a third to Zante.

Directions.—In clear weather, the steeple of Lecce cathedral, on a hill, $19\frac{1}{2}$ miles northwestward of Otranto and 6 miles from the shore, is the first conspicuous object seen by a vessel bound to Otranto from the Adriatic. When approaching from the southeastward the highland of Cape Otranto, the several towers before described, the semaphore of Palascia, and the lighthouse below it will be seen. After passing the cape, the buildings on the western side of the bay and then the town of Otranto and its castle will open out. The town should then be steered for; the Secche and the rocks projecting from St. Nicola Point will be seen as they are neared, and with a commanding breeze from between north and east the passage between them, having a depth of from $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms, should be taken, borrowing rather on the Secche side. In taking this passage a vessel should haul up promptly to starboard after rounding the shoal, as the depth decreases rapidly toward the town.

Vessels can not work into Otranto against westerly and south-westerly winds owing to the shallowness of the southern and south-western parts of the bay. A good anchorage in a depth of 5 or 6 fathoms, sand, may, however, be found between the Secche and Craul Point, but vessels should get under way at the first symptom of a breeze setting in from seaward.

Bora gales occasion a very heavy sea in the bay, and it is unsafe for sailing craft to enter when this wind is threatening. At such a time every endeavor should be made to weather Cape Otranto, and then to proceed under easy sail to the anchorage under Cape Sta. Maria di Leuca.

La Scala is a rocky shoal 600 yards in length northward and southward, with general depths of from 6 to 8 fathoms, on which the sea breaks in heavy weather; the least water, $4\frac{1}{2}$ fathoms, lies 1,000 yards 37° from the lighthouse on Craul Point. Vessels approaching Craul Point from the northward should give the shore a berth of at least 1,600 yards until southward of the shoal.

The coast from Otranto to near San Cataldo Point, consists chiefly of rocky wood-crowned heights with richly cultivated ground, especially in the neighborhood of Otranto; it then presents a low, level outline and the country is marshy with but few dwellings southward of Brindisi. The steeple of Lecce Cathedral is the only conspicuous object until the shore is closely approached, when a few towers, which mark the temporary anchorages of coasting vessels, become visible.

The shore is everywhere bordered by a bank which, in places, extends nearly $\frac{1}{2}$ mile offshore, with scattered rocks here and there. At 600 yards from the land the bottom is generally rock or sand; at 1 mile it is mud or sand; and outside this distance it becomes rocky with patches of mud. In fine weather vessels may without risk coast along at a distance of 1 mile, taking care, however, to avoid Missipezza, a rocky shoal with as little as 6 feet water upon it, situated 5 miles northward of Otranto and about a short mile northeastward of Fiumicelli Tower; there is a depth of 20 fathoms close outside it.

Light buoy.—A red conical light buoy, exhibiting a flashing white light, is moored nearly 200 yards eastward of the Missipezza.

Anchorage.—It is seldom quite safe for sailing vessels to anchor off this unprotected coast; small vessels, however, do so temporarily at the following places:

Alimini, a sandy bay about $3\frac{1}{2}$ miles northward of Otranto abreast of a lake of the same name; the best berth is about $\frac{1}{2}$ mile from the shore in a depth of $7\frac{1}{2}$ fathoms, with the ruins of Fiumicelli, the second tower northward of Otranto, bearing northward, distant 1 mile. Vessels also anchor farther out in from 10 to 13 fathoms.

Orso.—This anchorage, 8 miles northward of Otranto, may be identified by a tower and by a church $\frac{1}{4}$ mile inland. It is a small bay with a depth of 4 fathoms, good holding ground, between the tower and the southern point of the bay.

Northward of Orso tower are those of Rocca Vecchia and Specchia Ruggieri; the coast northward of Rocca Vecchia tower, and nearly as far as San Cataldo Point, is bordered here and there by scattered rocks awash. Near Rocca Vecchia tower are a small church and the ruins of a few houses.

San Cataldo anchorage is southeastward of the tower which stands on the sandy point of that name and bears about $71^{\circ} 30'$ from the town of Lecce. The anchor should be let go in a depth of 3 or 4 fathoms, sand, about $\frac{1}{2}$ mile southeastward of the lighthouse or tower and rather more than 600 yards from the shore. Large vessels anchor 1,400 or 1,600 yards southeastward of the lighthouse and nearly the same distance from the shore in $6\frac{1}{2}$ or 7 fathoms.

Light.—About 66 yards from the extremity of San Cataldo Point stands a white pyramidal lighthouse, 76 feet high, from which, at an elevation of 83 feet above the sea, is exhibited a flashing white light, visible 15 miles.

San Cataldo Point.—A rocky ledge, with from 3 feet to 2 fathoms water, extends about $\frac{1}{4}$ mile eastward of the point.

Shoals.—A shoal, with $4\frac{1}{2}$ fathoms water, is situated $1\frac{1}{2}$ miles north-northeastward of San Gennaro Tower, and there is a similar shoal $\frac{3}{4}$ mile farther northwestward.

Cape Cavallo—Light buoy.—A light buoy, exhibiting a flashing white light, is moored about 1.3 miles 28° from Cape Cavallo. The light is 11 feet above the water and visible 5 miles.

Shoal.—A shoal with a least depth of 4.9 feet exists 798 yards $25^{\circ} 30'$ from the tower on Cape Cavallo.

Beacons—Depths on shoal.—Beacons, consisting of staffs with disks on masonry bases, are erected on the shoals located 513 yards 68° and 623 yards 353° from the tower on Cape Cavallo.

The northern extremity of Secca Piatti was examined and found to be extending seaward and to consist of two arms, one extending 131 yards in a northeastern direction and the other 87 yards in a northwestern direction, with least depths of about $\frac{1}{4}$ fathom.

San Gennaro.—About $2\frac{1}{4}$ miles northward of San Cataldo lighthouse is Veneri Tower; $3\frac{1}{2}$ miles beyond the latter is Chianca Tower; then follow Rinaldo and Specchiolla Towers. Vessels also anchor southeastward of San Gennaro Tower, $2\frac{1}{4}$ miles northward of Specchiolla Tower, the depth being about 4 fathoms, mud and weeds, and finally, about 1 mile southward of Cape Cavallo, southeastward of Brindisi, where good shelter from northwesterly and offshore winds may be found in 3 or 4 fathoms, sand.

Port of Brindisi—General remarks—Depths.—Brindisi derives considerable importance from its being the most eastern port in Europe, from whence the mails are embarked for India, China, Australia, etc. It is the best anchorage for large vessels on the western shore of the Adriatic and is conveniently situated for vessels bound to the Albanian coast or to the Ionian Islands. Cape Cavallo, a low projection marked by a round tower at its extremity, and Cape Gallo (Penna Point), $4\frac{3}{4}$ miles northwestward of it, on which stands a lighthouse and a square tower, form the extremities of the bay.

The outer road is partially protected from easterly winds by the Pedagne Rocks and the shoal ground connecting them with the mainland; the outer harbor and inner road is sheltered by the Islets Castello and St. Andrea, with their mole and breakwater. The anchorage ground in the two roadsteads extends from the Pedagne Rocks in a $251^{\circ} 30'$ direction for nearly $1\frac{1}{2}$ miles up to the entrance channel of the inner harbor, which, immediately inside the entrance and fronting the town, divides into two branches, the northern branch extending westward, the other in a southerly direction, between them inclosing the town and together forming the inner harbor.

The outer road is available for all classes of vessels, and the inner harbor is available for vessels of about 27 feet draft. Dredging is in progress to deepen the inner harbor to $29\frac{1}{2}$ feet and the entrance and fairway to 32 feet. (See inner harbor.)

The Roadstead is divided into an outer and inner road.

Caution — Improvements in progress — Buoys.—Improvements are now in progress in Brindisi Harbor, in consequence of which vessels can enter only between sunrise and sunset.

Buoys have been moored to mark the danger line. All vessels are required to pass between two white buoys, each carrying a red flag, moored 165 yards apart.

The outer road is between the Pedagne Rocks and Castello Island, with depths of 7 to 10 fathoms, principally rocky bottom. It is open to northerly and northeasterly winds; easterly winds also are troublesome, but the Pedagne Rocks then protect it and prevent there being a very heavy sea. The best anchorage is in a depth of about 7 fathoms, $\frac{1}{4}$ mile eastward of Fort Mare.

The inner road or outer harbor comprises the small space westward of the Bardet Buoy and Fico Light-Beacon, and is sheltered by the islets Castello and St. Andrea, with their mole and breakwater. The best part of this road is occupied by mooring buoys for the P. & O. Co.'s vessels, but vessels anchor on the western side in about 5 fathoms mud, and make use of the stern mooring shackles here mentioned.

On the northwestern shore, near Caprarella, are four large shackles, at high-water mark, secured by short chains to buried anchors; these shackles are 43 yards apart, and are occasionally used for stern moorings by craft anchoring off this part.

Harbors—Outer harbor.—St. Andrea and Castello Islands, forming the eastern side of the outer harbor, are connected by a bridge; the eastern and northern sides of St. Andrea are bordered at the distance of 300 yards by rocks and shallow water with 4 fathoms close outside. A breakwater connects its northern end with a point of the mainland westward, forming within it, on the south, this small and well sheltered anchorage for vessels of a moderate size, having from 4 to 6 $\frac{1}{2}$ fathoms water on the islets' side, where vessels moor with a cable to the shore. The western shore of the harbor is bordered at the distance of about 250 yards by a bank.

On the southern end of Castello is Fort Mare, where there is a disinfecting apparatus and rooms for a quarantine hospital; a breakwater extends 250 yards from the fort in a south-southeastward direction.

Between the southern end of Castello Islet and the end of the breakwater, the Bardet Shoal, a bank of sand with patches of rocks and weed, extends southwestward 250 yards, with a depth of 3 feet near its extremity, and a rock awash between it and the fort. This shoal is being removed by dredging.

A channel, about 400 feet wide, has been dredged to the depth of 27 feet into the outer harbor, between Castello Island and the main. It

is marked by four beacons, surmounted by squares on the eastern side, and by three beacons, surmounted by triangles on the western side.

Inner harbor.—The entrance to the inner harbor is at the southwestern end of the inner roadstead, the passage to it being a narrow channel about 400 yards in length, with a minimum width of 360 feet; this channel and the fairway approach to it from seaward is said to have been dredged to a depth of 32 feet.

The northern and widest branch of the inner harbor is nearly 1 mile long, with depths of from 22 to 28 feet, shallowing toward the head; dredging is being carried on with a view of maintaining the depth necessary for the deeper class of vessels using the port. The southern arm where the bottom is mud, has been dredged to a depth of 30 feet for a length of about 300 yards by a breadth of nearly 200 yards, while the remainder of this extensive sheet of water is being deepened to 27 or 28 feet. This branch narrows and at present becomes shallower toward the head, where a dock is eventually to be constructed.

The depth of the inner harbor is said to be maintained at 32 feet wherever there are deep water quays; these quays are about 1 mile in total length.

There is a depth of 4½ fathoms shown on the chart in the channel leading to the inner harbor and its approach from seaward. Dredging is in progress.

The northern and eastern sides of the town are faced by quays. Between the port office and the Romana Column is the slightly projecting town quay, used by the P. & O. Co.'s vessels. On the north-western side of Pigionati Channel is the P. & O. Co.'s coaling quay.

A masonry sea-wall, about 5 feet high, has been built around the western arm of the harbor, where deep quays do not exist, and on it is a broad road. At frequent intervals on the wall are large bollards for securing vessels' stern hawsers, and the whole length is lit by electric arc lights. Vessels lie about 30 feet off the wall, and goods are loaded or discharged by the use of stages.

From about 200 yards eastward to 600 yards westward of the castle a line of wooden pontoons stands out on large concrete piles. This line is broken at intervals to give room for a pier with two small cranes, a 4-ton revolving crane, a camber for submarines, a floating dock, and another revolving crane.

A large part of the Inner Harbor has been reserved for naval vessels exclusively, and on the northern shore of the western arm are extensive Government coal depots; there are other depots on the eastern side of the entrance to the Inner Harbor. At the head of the southern arm is an oil depot, with two jetties, where six destroyers can take in oil at the same time.

Buoys.—A bell buoy, red and black and surmounted by staff and cone, is moored in a depth of 4 fathoms near the southern extremity of Bardet Shoal, 310 yards 266° from the occulting green light on the head of the jetty southward of Castello a Mare.

There is a mooring buoy in the middle of the outer harbor westward of the northern end of Castello Island.

The outer mooring buoy for the use of the vessels of the Peninsular & Oriental Steam Navigation Co. lies about 900 yards $251^{\circ} 30'$ from the lighthouse on Fort Mare Breakwater, and the inner buoy is about 150 yards farther southwestward.

Three mooring buoys lie on the eastern side of the southern arm of the inner harbor and one mooring buoy eastward of Arena Point, in the western arm.

Two dark-red mooring buoys lie just westward of the fairway of the inner road for the use of the Peninsular & Oriental Co.'s steamers. The outer mooring buoy bears about 254° nearly 600 yards from the Bardet Buoy and 500 yards $279^{\circ} 30'$ from the Fico Light Beacon; the inner buoy lies 267 yards $240^{\circ} 30'$ from the outer.

Two white buoys with red flags have been moored between the extreme of Fort Mare Breakwater and Secca del Fico to mark the dredged channel, the depth in which is reported in 1916 to be 30 feet. Vessels should pass between the buoys.

Deposit—Buoys.—About $\frac{1}{2}$ mile eastward of Cape Gallo is moored, in a depth of 18 fathoms, a red buoy to mark where the material dredged up from the port is to be discharged.

Deposit.—A can buoy is moored about 1,100 yards northeastward from Licola Point to mark a place for depositing material arising from dredging in Brindisi Harbor.

Secca del Fico extends about $\frac{1}{4}$ mile northeastward of Secca del Fico Point, which is situated about $\frac{1}{2}$ mile eastward of the entrance to the inner harbor; it has less than 3 fathoms water, but Fontanella Rock, 100 yards off the beach, has 4 feet water. Light beacon, see page —.

Secca del' Arco.—This rock lies in the southwestern part of the outer road, 600 yards from the shore; it has 3 fathoms of water over it and depths of from 6 to 7 fathoms close around; from the rock, Fort Mare Mole Lighthouse bears 298° , distant 750 yards, and Pedagne Lighthouse 57° .

A patch of $4\frac{1}{2}$ fathoms lies 600 yards eastward of the Secca del' Arco, with the Pedagne Rock Lighthouse bearing 46° , rather more than 1,000 yards. At 250 yards northwestward of this patch the depth is only $5\frac{1}{4}$ fathoms.

Rock.—A rock, situated about 600 yards southeastward of Riso Point Lighthouse, has been removed to a depth of $5\frac{1}{4}$ fathoms.

Pedagne Rocks.—A breakwater extends from Cape Bianco northeastward to the southern point of Pedagna Grande, and closes Trapanelli Passage, but there are two small passages for boats 100 yards and 400 yards from Cape Bianco.

Conspicuous chimney.—There is a conspicuous chimney on the shore about $\frac{3}{4}$ mile west-southwestward of Cape Bianco and near the mouth of the Fiume Grande.

Secca S. Andrea, a patch of $5\frac{1}{2}$ fathoms, lies northward of S. Andrea, with Riso Lighthouse bearing 143° , distant about 800 yards.

The Pedagne Rocks are five low rocks covering a space of more than 1,200 yards in a 291° and opposite direction. They extend 1,400 yards 330° from Cape Bianco, and, with the shallow rocky bank by which they are joined to that cape, afford great protection to Brindisi roadstead and harbor. The 5-fathom curve of soundings passes within less than 200 yards of the northern side of the rocks, but the space between them and Cape Cavallo, $1\frac{1}{4}$ miles southeastward, is all shallow water, extending northward nearly 1 mile from the shore, and at 1,400 yards 83° from the eastern rock is a rocky patch of 2 fathoms, with two others of but slightly increased depth 300 yards within them; the general depths close around these patches are from $3\frac{1}{2}$ to 5 fathoms.

Clearing marks.—Small craft sometimes pass over the rocky bank connecting the Pedagne Rocks with the shore. It is named the Trapanelli Passage, but no more than from 4 to 5 feet water can be depended on.

Secca Piatti.—At 600 yards 350° from the tower on Cape Cavallo is the Piatti Rock, above water, and 450 yards 67° from the tower is the Cavallo Rock. Cape Cavallo, being surrounded by shoal rocky ground, should not be approached nearer than 1 mile, nor into a less depth than 15 fathoms.

Secca Piatti—Beacons.—Secca Piatti and Secca Cavallo are each marked by a beacon on their eastern sides.

Shoal.—A shoal with a depth of 5 feet lies 420 yards eastward of Secca Piatti Beacon.

Lights—Pedagne Rocks.—From a circular white tower 60 feet in height on West Traversa, the northwestern Pedagne Rock, is exhibited, at an elevation of 69 feet above the sea, a fixed and flashing white light, visible 14 miles. (See Light List.)

Riso Point.—On Riso Point, the northeastern extremity of the rocks extending from St. Andrea Island, stands a lighthouse 30 feet high from which, at an elevation of 43 feet above the sea, is exhibited a flashing white light visible 10 miles.

Cape Gallo.—On Cape Gallo or Penna Point, in the northwestern approach to the port, is a circular white lighthouse, from

which, at an elevation of 117 feet above the sea, is exhibited a fixed and flashing white light. The fixed, luminous range is 13 miles and the flash 24 miles.

Fort Mare Breakwater.—An occulting green light is exhibited, at 39 feet above high water, from a circular masonry tower 30 feet high on the end of Fort Mare Breakwater, visible 7 miles.

Secca del Fico.—A fixed red light is exhibited from a beacon situated in about $3\frac{1}{2}$ fathoms water, 440 yards 225° from the light-house on Fort Mare Breakwater. The light is unwatched.

Inner Harbor Entrance.—Two fixed red electric lights placed vertically 29 and 36 feet above high water are exhibited from a red hut 24 feet high near the head of Pigonati Mole, on the southeastern side of the entrance to the Inner Harbor, visible 5 miles. The lights are unwatched.

Two fixed green electric lights placed vertically 29 and 36 feet above high water are exhibited from a red hut 24 feet high on the northwestern side of the entrance, visible 5 miles. The lights are unwatched.

A fixed red electric light is exhibited at 29 feet above high water from an iron standard 22 feet high on Pigonati Quay, about 200 yards southwestward of Pigonati Mole, visible 5 miles. The light is unwatched.

A fixed green electric light is exhibited at 29 feet above high water from an iron standard 22 feet high on the inner end of the northwest quay, opposite the light on Pigonati Quay, and visible 5 miles. The light is unwatched.

Inner Harbor.—A fixed light, showing a red ray seaward, is exhibited from the vicinity of the health office.

The quays forming the sea face of the town are illuminated by electric lamps shown from high iron columns.

Three red electric lights in the form of a triangle—upper light 59 feet and two lower lights 52 feet above the sea, are exhibited from an iron column on the quay near the Romana Column. The upper light is on the prolongation of the axis of the entrance channel and the lower lights are each 3 feet to one side of the same line. Vessels entering are given the right of way.

These lights will show as fixed lights when vessels can enter and as occulting lights when vessels can not enter.

Dredging—Signals.—Dredging works are in progress in the vicinity of Pigonati Channel, between the Inner Road and the Inner Harbor, and during their continuance the following signals are to be made, and their signification must be strictly complied with:

Before entering or leaving the Inner Harbor a steamer is to give four short blasts by the siren, and a sailing vessel four blasts by a horn. These signals will be replied to thus:

A black ball hoisted on the operating dredger, or other craft, signifies passage closed.

A red flag signifies passage clear.

The flag will be hoisted on that side of the dredger on which the vessel can pass.

Dredging work is carried on between daylight and sunset.

Prohibited anchorages.—Merchant vessels are prohibited from anchoring in the outer harbor, northward of a line drawn from Fort Mare Semaphore 267° to the western shore; in the Inner Harbor, westward of a line drawn 332° across the western arm, about 150 yards westward of Arena Point, and southward of a line drawn 250° across the southern arm, about 200 yards from the head.

The limits of the prohibited areas are marked by posts surmounted by balls.

Directions.—The land in the vicinity of Brindisi, being very low, is sometimes difficult to recognize, especially during southerly winds, when it becomes obscured, and the lead is then the only guide. Between Otranto and Brindisi depths of from 50 to 55 fathoms will be found about 5 miles from the land until within 8 or 10 miles southeastward of Cape Cavallo, when the water shoals somewhat; on nearing Brindisi the bottom becomes weedy abreast of Cape Cavallo; off Cape Gallo there is hard mud, and between it and Cape Cavallo, rock, sand, or gravel.

The steeple of Lecce Cathedral, 20 miles southward of Pedagne Lighthouse, is, even in clear weather, the only object which can be distinguished at a distance by vessels from the eastward or southeastward. From the northward or northwestward Penna Tower and Cape Gallo Lighthouse, on the extremity of that rocky point, are good guides to vessels bound to Brindisi and are the objects first seen on this low coast, which is otherwise not visible beyond the distance of 7 or 8 miles. In the vicinity of the harbor Pedagne Lighthouse, Fort Mare, and the round tower on the extremity of Cape Cavallo are successively seen.

From the northwestward, after passing Cape Gallo at a safe distance, steer for Pedagne Lighthouse, taking care not to bring it eastward of a 128° bearing and to keep Cape Cavallo Tower open eastward of it, to avoid the shallow water extending nearly $\frac{1}{2}$ mile from the shore midway between Cape Gallo and St. Andrea Islet, and also to avoid the Secca St. Andrea of $5\frac{1}{2}$ fathoms, 650 yards northward of St. Andrea Islet.

When Pedagne Rocks Lighthouse bears 128° , and Fort Mare Breakwater Lighthouse 218° , steer 173° until the latter lighthouse

bears 240°, to avoid the 5½-fathom rock situated about 600 yards southeastward of Riso Point Lighthouse. Then steer to pass about 100 yards southward of Fort Mare Breakwater Lighthouse and Bardet Shoal Bell Buoy, and northward of the Secca del Fico Light Beacon, and between the two white buoys with red flags marking the dredged channel.

Continue westward until the trellis mast from which the entry signals are exhibited is open northwestward of the southeastern shore of Pigonati Channel, then steer for the trellis mast, keeping it in mid-channel.

Caution.—Vessels are required to go as slow as possible through the Pigonati Channel.

Entry signals.—The following signals are made from an iron trellis mast situated near the Romana Column, and on the prolongation of the axis of the Pigonati (entrance) Channel, to indicate to in-going vessels that the entrance is clear, or that the channel is obstructed by an out-going vessel:

| Signal. | Signification. |
|--|------------------|
| By day—Two disks horizontal..... | Entrance clear. |
| Two disks vertical..... | Entrance closed. |
| At night—Three fixed red lights in a triangle..... | Entrance clear. |
| Three occulting red lights in a triangle..... | Entrance closed. |

The disks are 13 feet apart. The lights, which are unwatched, are placed at the points of an equilateral triangle, apex upward, the upper light being 59 feet above high water, and the lights about 11 feet apart.

The lights appear as one light at the distance of about 5 miles, and are separately distinguishable at the distance of about 1 mile.

In order to avoid accidents in Pigonati Channel it is directed that an out-going vessel must wait and leave the channel clear for an in-going vessel, when both vessels would otherwise be in the channel at the same time.

From the southeastward.—Approaching from the southeastward, in order to avoid the shoal ground off Cape Cavallo, Cape Gallo Lighthouse should not be brought northward of 288°, nor a less depth than 15 fathoms obtained, until Fort Mare Breakwater opens northward of Pedagne Lighthouse. When Fort Mare Mole Lighthouse bears 243°, steer for it until Pedagne Lighthouse bears 122°, and then steer to round Fort Mare Breakwater as before directed.

At night.—Approach with Fort Mare Breakwater Light bearing 240°, and when Pedagne Rocks Light bears 128° steer to pass southward of the breakwater light, and northward of Secca del Fico Light, and between the two white buoys with red flags marking the

dredged channel. Then steer 268° until the three red lights exhibited from an iron trellis mast near the Romana Column are open north-westward of the two vertical red lights on Pigonati Mole, if the channel is clear, when avoid the two mooring buoys in the inner road and steer for the three red lights near the Romana Column, and through the Pigonati Channel, in which the green lights are left on the starboard, and the red lights on the port hand.

In leaving the harbor, keep the three red lights near Romana Column open of the southeastern side of Pigonati Channel until Secca del Fico Light bears 83° , to avoid the shoal ground extending from the southern shore of the Inner Road.

The town of Brindisi (ancient Brundisium), the scene of many remarkable historical events, has a population of about 28,438. It is the see of an archbishop, but the cathedral is much dilapidated. At the northwestern corner of the ancient wall which partly surrounds the town is the old Genoise Castle, unarmed, but flanked by huge round towers and conspicuous from all sides.

The town is not healthful, ague and fever being common and owing chiefly to the marshy land in its neighborhood, especially at the head of the southern branch of the port.

Important works by draining off the superfluous stagnant waters from the vicinity are being carried out, by which it is expected that considerable reduction will be made in the prevailing malaria.

The northern and eastern sides of the town are faced by good quays. The railroad station is on the western side of the town, but a branch runs from it around the southern side of the town to near the Port Office. On the northern shore of the western branch of the port, opposite the northeastern part of the town, is a Government wharf and the quay forming the Peninsular and Oriental Coal Depot.

Time signal.—A ball is hoisted close up to the top of the eastern mast of the radio station, situated about 350 yards northeastward of Arena Point, at five minutes before the signal, and dropped at noon standard mean time, or 23h. 0m. 0s. Greenwich mean time.

A gun is fired from Vittoria Castle at noon, but must not be used for determining the errors of chronometers.

Pratique—Regulations.—Vessels entering the port from abroad after sunset and not desiring to obtain pratique immediately should anchor in the outer or inner road and hoist a red light.

Vessels entering the port from abroad after sunset and desiring to obtain pratique immediately are to hoist a red light and may enter the inner harbor.

The red light is always to be kept hoisted until pratique has been granted by the proper officer.

These regulations must be strictly complied with.

Communication.—Brindisi communicates by railroad with Gallipoli and Maglia southward, with Reggio and Naples westward, and through Bologna northward with the whole European system.

The through steamer traffic is, also, very large and increasing. Under normal conditions steamers calling at the Austrian ports and at all the principal Italian ports from Venice to Genoa, including Sicily, leave twice weekly. For Greece, six times weekly. For Constantinople, Black sea ports, and Syria, twice weekly. For Malta, Gibraltar, and London weekly. For Marseille fortnightly. For China, Japan, and Australia thrice monthly (two Peninsular & Oriental steamers and one German). For India eight times monthly (four Peninsular & Oriental, two German, and two Austrian steamers). For Egypt, frequently by all three nationalities.

For Liverpool and North American ports, thrice monthly. For North Germany and the Baltic, monthly during the export season. Also for Cette, Bordeaux, etc., occasionally.

Brindisi is the most convenient port for travelers to and from the East, and from 19,000 to 20,000 passengers land and embark yearly.

Trade.—The principal imports are petroleum, sulphate of copper, dyewoods, timber, iron and metals, staves and rushes, cattle, hides, and skins, and coal, the latter being one-half of the whole imports. The exports are wine, dried fruit, wine lees, casks, earthenware, argols, hats, and coral for India in transit from Leghorn.

Coal and supplies.—Coal can always be obtained in any quantity. Owing to the formation of labor leagues and trade-unions, with a limited number of members, the discharge of steam colliers is limited (1913) to 500 tons a day. Vessels of deep draft can coal alongside the quays, the depth varying from 20 to 25 feet, the latter depth being at the Pontoon Wharf for berthing the largest P. & O. steamers. Coaling is usually carried on both from the quay and from lighters, from 50 to 100 tons per hour being put on board in this manner. The stock of coal on hand is generally about 15,000 tons. Fresh provisions of all kinds are plentiful. There is a large iron water boat here, and water is obtained from a fountain near the customhouse.

Water.—At the back of the castle are tanks containig 5,000 tons of distilled water, which is laid onto each destroyer's berth.

Dock.—See Appendix.

Hospital.—The naval hospital can take from 100 to 150 patients, and an additional 30 to 40 patients in the isolation wing.

Repairs.—The engineering works of the Cantiere Meccanico Brindisino are reported to be capable of executing ordinary repairs to hull, machinery, and boilers. The foundry can undertake castings in brass up to 15 hundredweight and in cast iron up to 30 tons.

Radio.—A radio station has been established at Brindisi, and is open to the public at all times. The call letters are I.C.E.

Telegraph cable.—A telegraph cable is laid between Brindisi and San Giovanni di Medua.

Semaphore.—There is a semaphore station at Fort Mare.

The coast between Brindisi and Gargano Head, distant 107 miles to the northwestward of it, is generally low, Mount Gargano being the only mark for vessels making the land until within 10 or 12 miles of it, when, in clear weather, the towns, villages, and towers scattered along the shores, many of them on slight eminences, may be distinguished.

Between Brindisi and Barletta, about 87 miles northwestward of it, there are numerous towns, especially in the vicinity of the latter, all of which lie on the main line of railroad to Brindisi, which skirts the shore the whole way, and each has a small port frequented by coasting vessels. At Monopoli, the first of these ports, the flat country disappears and the land maintains a moderate elevation, with patches of cultivation, to near Barletta; beyond which, and as far as Manfredonia, sandy marshes prevail, which, together with Salpi Lake, render the climate rather unhealthful. This coast may be safely navigated at the distance of 1 to $1\frac{1}{2}$ miles; and in fine weather, with land winds, even large vessels may temporarily anchor at about this distance from it in a depth of 17 or 18 fathoms hard mud.

Anchorage, etc.—Although the harbors on this coast are accessible to small craft only, there are tolerable summer anchorages abreast of some of them, and a short description of these and of the various points of recognition along the shore may be useful.

Cape Gallo Lighthouse, about 3 miles northwestward of Pedagne Lighthouse, is, as before remarked, a good guide to vessels bound to Brindisi from the northward. Carovigno and Ostuni, towns on high ground 4 miles inland, are good marks when making the land between Brindisi and Monopoli and bound for the anchorage off Villanova or elsewhere. These towns are respectively 15 and 18 miles northwestward from Brindisi.

Small coasting craft which can, if necessary, haul up on the shore anchor at a short distance from it during fine weather in the creeks known by the towers; among other places westward of Penna and Testa Towers, southward of Vacito Tower, and off Santa Sabina and Pozzelli Towers.

The tower of Villanova is about 20 miles from Brindisi and nearly northward of the hill on which stands the town of Ostuni; the place is visited by small craft only, which anchor near the tower and close to the shore.

St. Leonardo Tower is nearly $2\frac{1}{2}$ miles northwestward from Villanova, and $3\frac{3}{4}$ miles farther on is the tower of Canne; at $4\frac{1}{2}$ miles

beyond the latter is Egnaxia Point, on which are the ruins of the ancient town of that name; then follows the tower of Cindola, close to which is a boat creek. Between this tower and Egnaxia boats can, without difficulty, haul up on the shore, a convenience not afforded by any portion of the coast within 4 or 5 miles northward of Cindola Tower.

St. Stefano Tower is next to Cindola; at St. Stefano is a small inlet available for fishing boats; it is 2 miles southeastward of Monopoli and may be recognized by a large edifice on a height close to the sea.

Port Monopoli is an inlet with three coves running in from it, rather more than 300 yards deep and rather less than 250 yards wide; it is exposed to northerly winds and the holding ground is bad.

A mole, extending about 200 yards in a northerly direction from the castle, forms the eastern side of the port and greatly improves its small natural capabilities. At the northern side of the port a mole, to be about 320 yards in length, is under construction, which is nearly (1914) completed; it extends east-northeastward about 250 yards from the shore, and then turns east-southeastward 250 yards; its outer end is about 250 yards north-northeastward of the northern end of the southern mole. It is marked by a fixed green light.

Vessels that enter the port are chiefly of small tonnage, which mostly anchor close in, with a stern warp to the shore; and amongst them a few small steamers, there being weekly steam communication between it and other Italian ports. In fine weather large vessels may anchor outside the town.

Lights.—A fixed red electric light is exhibited, at 50 feet above high water, from a red hexagonal tower, 45 feet high, on the southern molehead at Port Monopoli, visible 9 miles.

A fixed green electric light is exhibited, at 34 feet above high water, from a post about 70 yards within the outer end of the northern mole at Port Monopoli, visible 6 miles. The light is unwatched. This light should not be closed to less than 100 yards. (See Light List.)

Mooring buoy.—A mooring buoy is moored 256 yards $319^{\circ} 30'$ from the fixed red light on the mole.

The town is on the main line of railroad and stands amidst olive, lemon, and orange plantations, on rather higher ground; the outer portion of the walls surrounding it being washed by the sea. It contains a population of 22,000 and is defended by the castle just mentioned.

Oil, dried fruits, etc., are exported in considerable quantities; the imports are coal, grain, cattle, wood, tiles, etc.

Supplies.—Coal may sometimes be obtained, but only in small quantities; vessels can coal either at the quay, which has a depth of 13 feet alongside, or at anchor in about $4\frac{1}{2}$ fathoms; larger supplies

can be procured by rail from Bari or Brindisi. There is a very good hospital available for seamen at a small charge for maintenance.

The land contiguous to the town is fertile, well, cultivated, and presents a picturesque appearance.

Coast—Polignano.—This small port, $4\frac{1}{2}$ miles northwestward from Monopoli, is fit for boats only. The town is on a steep craggy rock surrounded by olive trees; at the foot of the rock is a spacious cave.

Between Monopoli and Polignano are Orto and Ancina Towers; beyond these is St. Paolo, a rocky islet, on which are the ruins of a monastery. St. Vito Tower, which has a large building southward of it, is $1\frac{1}{2}$ miles northwestward of Polignano; beyond it is Rapagnola Tower on a projecting point, and 4 miles farther is the town of Mola.

Mola.—Coasting vessels anchor either eastward or westward of Mola. On the eastern side, from near the northern extremity of the town, a rocky ledge formed into a mole and connected with the shore by a jetty on piles, extends southeastward for more than 200 yards; this affords shelter to small craft from northerly winds in about 6 feet water.

The town, containing with its environs about a population of about 12,000, stands close to the seaside on a low shore; it has but little trade.

In fine weather vessels anchor in a depth of $5\frac{1}{2}$ fathoms, hard mud, about $\frac{1}{2}$ mile off the town, which may be recognized by its cathedral and two white conspicuous steeples.

Light.—From an iron trellis mast 33 feet high, on the head of the mole at Mola, an occulting green lantern light is exhibited at an elevation of 38 feet above the sea, visible 5 miles.

The coast between Mola and Bari, 11 miles northwestward of it, is bordered by rocks and presents no remarkable features, except Pelosa and Carnosa Towers. St. Giorgio Cove is between the above two towers, and $\frac{1}{2}$ mile northwestward of its entrance is the Punta d'Oro Shoal, extending a short distance offshore, with $1\frac{1}{2}$ fathoms water. There is anchorage for small vessels off St. Giorgio Cove.

Bari.—The town of Bari (ancient Barium) stands close to the sea on a low projecting point; it is fortified and well-built, is the capital of the province of Bari, with a population of 102,844, and is the chief commercial town on the coast. It has two harbors, but the eastern one is of little use. Bari is on the main coast line of railroad, and is also the terminus of the line which crosses the land to Taranto. The environs are fertile. Many ancient tombs exist here and some fine vases have been discovered.

The town is readily distinguishable from the eastward by its two steeples, the highest of which is a square tower of a brown color, surmounted by a small steeple. The castle with its two black towers

afterwards appears, and then the high walls of the town. The population of the town in 1914 was 107,964.

Semaphore.—Within the castle in the new port is a semaphore station, with telegraphic communication.

Radio station.—There is a radio station at San Cataldo Point; it is open from 8 a. m. to midnight. The call letters are I.C.Q.

Old port.—The old port of Bari, on the southeastern side of the town is small and shallow; it is protected on its northern side by the town wall and by St. Antonio Mole projecting eastward about 200 yards, and on its southeastern side by St. Nicola Mole extending 200 yards northeastward from the beach, the moleheads being 200 yards apart on a 15° and 195° line of bearing.

The entrance between the moles is open to the eastward, and for about a third of the space inclosed, near the northern mole, the depth is from 6 to 9 feet; this space is sufficient for several small vessels, which moor under shelter of the northern mole with their heads eastward, and an anchor laid out in this direction as a precaution against the heavy sea which occasionally sets in. The old port is difficult of access in strong northerly and in easterly winds; in the former, the sea washes over the moles.

In entering the old port, care must be taken to avoid a rocky shoal almost awash, named *Secca del Monte*, on which the sea breaks in heavy weather; its outer edge is more than 400 yards 43° from the end of the northern mole, and between it and the mole, for a space of 200 yards, the depth is from 10 to 13 feet; it is marked by two red conical buoys, placed, respectively, at 100 yards 274° from the northern extremity, and close off the southeastern point. This shoal rises from the shallow rocky bank which surrounds the eastern side of the town.

Port Bari is formed by the *Foraneo Mole*, a breakwater which extends from the northern extremity of the town in a 313° direction for about half its length, and then 274° for the remainder, forming an elbow northeastward. its total length being about $\frac{1}{2}$ mile. About 300 yards southwestward from the inner end of this breakwater *Spagenta Mole* projects a distance of about 200 yards in a northwesterly direction, its outer end being in 20 to 22 feet water. An inner mole, 612 yards in length, known locally as the *Pizzoli Groin*, runs out in a general north-northeastward direction from the western part of the town, giving protection from the northwestward to small vessels; its head is 400 yards 167° from the outer end of the breakwater.

The inclosed area forms a considerable space of good anchorage, and between its head and the landing pier are two mooring buoys. The depth from 28 feet near the head decreases within it to 24 and 20 feet, and so on gradually to the shore. The breakwater completely

protects the port from strong northeastly winds, but it is imperfectly sheltered from the northwestward; nevertheless commerce here is very active.

A quay is being constructed along the Pizzoli Groin. Three mooring buoys are charted in the new port.

Dredging is in progress at the entrance of, and within, the new port; the dredgers exhibit two vertical red lights at night.

When the dredger is away from the dredging ground each of her mooring buoys is marked by a fixed red light.

Trade.—The imports consist of cotton and woollen goods, drugs and tobacco, metals, petroleum, grain, coal, etc., the exports consisting of wine, oil, almonds, potash, figs, and vegetables.

Coal and supplies.—From 10,000 to 12,000 tons are usually in stock. There is no proper coaling wharf, but vessels ship coal alongside the breakwater, where there is a depth of about 25 feet.

Supplies are plentiful. Water (rain) is procurable.

Repairs.—There is an engineering establishment and also several machine shops at Bari where any kind of repairs to hull, engines, or boilers can be made good.

Communication.—The Cunard Co. during normal conditions has a monthly service; the Wilson Line of steamers, from London and Hull, a fortnightly; and Ellerman Line a weekly service to Liverpool, Bristol, etc. The Phelps Line calls occasionally from New York. The Puglia Steamship Co., etc., call here regularly.

Lights.—On **San Cataldo Point**, at 1,500 yards 281° from Bari Breakwater Head, is an octagonal white tower over a two-story dwelling 205 feet high, from which is exhibited, at an elevation of 216 feet above the sea, a fixed and flashing white light, visible 16 miles.

Foraneo Mole.—A flashing white light is exhibited, at 49 feet above high water, from a masonry tower, with dwelling, 41 feet high, 54 yards within the extremity of Foraneo Mole, visible 12 miles.

Pizzoli Groin.—A fixed green light is exhibited, at 30 feet above high water, from a small tower on the northern extremity of Pizzoli Groin, visible 5 miles. (See Light List.)

Breakwater.—From a masonry tower with dwelling, 41 feet in height, situated 50 yards within the extremity of the (New Port) Breakwater, a flashing white light is exhibited. The light, elevated 49 feet above the sea, is visible 12 miles. (See Light List.)

Harbor lights.—Fixed red lights are shown from each of the two outer corners of Spagenta Mole on the southeastern part of the port. These lights open of the breakwater light afford assistance in making the port at night.

Old port.—A small fixed green light, elevated 23 feet above the sea, is shown from an iron pole on St. Antonio Mole Head, visible 2 miles.

Anchorage.—Vessels of deep draft may anchor in a depth of 17 fathoms, sand, about 1 mile off Bari, with the two conspicuous steeples of the town in range, or with the castle appearing between them. This spot is sheltered from southerly and from westerly winds, but is greatly exposed to those from the northward and eastward. Nearer the town, especially between the depths of 10 and 5 fathoms, the bottom is foul. There is also anchorage about 1,400 yards northwestward of San Cataldo Lighthouse and the same distance from the shore, in 10 fathoms.

Vessels of less than 24 feet draft may enter the harbor, taking care to give the head of the breakwater a berth of 100 yards in rounding it, and to keep within 200 yards of the breakwater, as the bay shoals rapidly southwestward of that line.

Pilots will usually be found off the breakwater. Signals will be made from the semaphore station when it is dangerous for vessels to enter the port.

Giovinazzo.—Between Bari and Molfetta, 13 miles farther northwestward, the only conspicuous objects are the lighthouse on the rocky point of San Cataldo; the tower of the small port San Spirito; and Giovinazzo, a small dilapidated town on a steep cliff, northwestward of which is a creek frequented by coasting vessels; its church has two brownish steeples of unequal height. In fine weather a vessel may anchor at a moderate distance off Giovinazzo a little westward of the town.

Molfetta.—The town of Molfetta, of some commercial importance, is on the main coast line of railroad, and contains a population of about 30,000; it stands on the seashore and presents an imposing appearance.

The port, which is on the northern and western sides of the town, is formed by a mole of most irregular form about 900 yards in length, with a general northwesterly direction from the shore.

The mole has been extended from the main light that formerly marked the extremity of the San Michele Mole, and it has considerably increased the accommodation of the port, which now affords fair shelter from all but strong northwesterly winds. The outer portion of the port has depths of about 4 fathoms, reducing gradually to its head. About 100 yards southwestward of the main light is the Secca di Domenico, a rocky ledge partly above water, lying parallel with and about 200 yards from the shore; before the present breakwater existed the only shelter was between this shoal and the town, only available for very small craft.

Mooring buoy.—A mooring buoy is moored 164 yards 311° from the flashing light on the mole.

Molfetta.—A mole extends north-northeastward about 200 yards from the southern shore of the port, and is (1914) being continued about 100 yards farther.

Lights.—A flashing white electric light is exhibited, at 66 feet above high water, from a white octagonal tower on a circular base, 60 feet high, on the angle of the mole about 600 yards from the outer end, visible 14 miles. (For the arc of visibility, see Light List.)

A fixed red light is exhibited, at 27 feet above high water, from a lamp-post, 15 feet high, on the outer end of the mole, visible 4 miles, but it can not be lighted in bad weather. It is unwatched.

A fixed red unwatched light is exhibited, at 58 feet above high water, from a masonry column, 49 feet high, situated near the harbor master's office, at the head of the port, visible 5 miles.

A fixed green unwatched electric light marks the extremity of the works in progress for the extension of a mole on the southern side of the port.

Beacon.—A white truncated pyramidal stone beacon, with square base, 11 feet high, stands on the extreme western rock of the *Secca di S. Domenico*.

Bisceglie.—This port, $4\frac{1}{2}$ miles northwestward of Molfetta, is little more than 200 yards in extent; it is open to the northward, but is sheltered from easterly and from westerly winds; has a depth of 2 fathoms at the entrance and from 6 to 10 feet in the middle. It is formed by an indentation of the shore on the westward and by a mole extending about 200 yards in a 330° direction on the eastward; the entrance is about 120 yards wide. The small craft which frequent the port moor to the quays or alongside the mole or to a bollard on the rock near the center of the port, southward of which there is scarcely a depth of 3 feet.

Harbor works.—Dredging is in progress in the port of Bisceglie, the East Mole is to be extended, and a new jetty is being constructed.

Caution.—The inner part of the West Mole should not be approached within 20 yards, as depths of 9 feet extend along the southern side for a distance of 200 yards from the outer extremity.

The town of Bisceglie is close to the shore; it contains a population of about 44,422, trades in oil and fruits, and has one or two small establishments for building and repairing coasting vessels. It is entirely destitute of springs, and rain water only is procurable.

Trani is a handsome town surrounded by lofty walls, protected by a castle, and has a population of about 26,000. It may be recognized by a church on an eminence near the center; also, by the castle with three bastions at its western extremity.

The port is $4\frac{1}{2}$ miles northwestward of Bisceglie, and, though once important, is now almost filled with sand, so that scarcely 10 feet water can be found at its entrance and only 5 feet in the middle.

Its shape is circular; the entrance, less than 100 yards wide and open to the northward, is between two piers. It is only capable of admitting vessels of very light draft, which may moor under shelter of the eastern pier.

In fine weather and with an offshore wind vessels anchor off the coast at about 1 mile from the port in a depth of 7 to 9 fathoms sandy bottom.

Gunnery practice ground.—On the Marina di Trani there is a practicing ground for gunnery, which extends $1\frac{1}{2}$ miles westward of the Castello di Trani and nearly 1 mile offshore. During practice the limits of danger are indicated by two red flags with black balls over, the eastern signal is made on the Cascina Arisciano, and the western $1\frac{1}{2}$ miles westward of the Castello di Trani, where the practice is being carried out.

Light.—From a circular turret on Trani East Pier, at an elevation of 31 feet above the sea, is exhibited an occulting red light, visible 4 miles; it can not be lighted in bad weather.

Barletta is $6\frac{1}{2}$ miles northwestward of Trani, and the coast between is low, sandy, and uninhabited; boats may haul up on it. The town of Barletta was once splendid and populous, but now presents an indifferent aspect, though from the great harbor improvements in progress and approaching completion, it is possible that its ancient prosperity may revive. The streets are well paved, the houses large and lofty, the cathedral remarkable for its antique granite columns, and the citadel is spacious and commands the port.

A considerable trade is carried on in salt, prepared near the town in salinas, which render the atmosphere very unwholesome.

The population is about 42,345.

As with other towns on this seaboard, Barletta is on the Adriatic Coast Line Railroad, but from Barletta the line passes inland through Foggia, and avoiding the highlands of Gargano, approaches the coast again just westward of Lake Lesina. Barletta also communicates with Bari by tramway.

Harbor.—The harbor is northeastward of the town and is formed on its western side by a mole of very irregular form which projects from the shore for 400 yards in a 341° direction, then continues 273 yards in an easterly direction 29° 270 yards, and finally 82° 317 yards; the total length is about 1,260 yards.

On its eastern side a mole commencing about 350 yards eastward of the castle projects in a 12° direction about 700 yards, and thence continues with a slight curve inward for about the same distance; from its extremity the light on the West Mole head bears 223° , distant 500 yards.

Depths.—The space inclosed between these moles is about 130 acres in extent; of this, the inner part is very shallow, having less

than 12 feet; it is being dredged to a depth of 18 feet. Vessels of 21 feet draft can enter the port and lie alongside the western mole. It is proposed to lay rails to connect the harbor direct with the railroad.

The depths in the harbor were reported in 1912 to have decreased about 3 feet owing to silting.

A shoal with $2\frac{1}{2}$ fathoms water extends 150 yards eastward from the end of the West Mole.

A light buoy.—The area being dredged is marked by a white buoy showing a red lantern light.

The dredger does not obstruct the entrance to the port.

Communication.—The Florio Rubattino and Puglia steamship lines, besides other vessels, maintain regular communication between this port and Venice, Sicily, and Genoa.

Trade.—The principal imports consist of wood, coal, spirits, and mineral oils. The exports are wine, brandy, olive oil, wheat, and wine casks.

Coasting vessels are built at Barletta.

Coal.—About 1,800 tons of coal or patent fuel are usually kept in stock by private firms; 15 small lighters of 5 to 6 tons can supply 200 tons in the day. Depth alongside coal wharf, 19 feet.

Supplies.—Provisions of all kinds can be obtained, but the water is bad. Naval vessels obtain the latter from the citadal, others from a cistern near the entrance, and there is a hose on the harbor-master's quay.

Lights—West Mole.—A circular brick lighthouse, 65 feet in height, stands on the middle inner angle of the West Mole at Barletta; from it is exhibited a group occulting white light at an elevation of 70° above the sea, visible 14 miles. It is unwatched.

The light exhibited from the West Mole head is unwatched.

A fixed green unwatched light is exhibited from the southeastern corner of the inner angle of the West Mole. (For the arc of visibility, see Light List.)

A fixed red light is exhibited from the northeastern extremity of the quay, near the harbor-master's office. (For the arc of visibility, see Light List.)

Breakwater.—From a red iron support at the extremity of the East Mole or Breakwater, at an elevation of 49 feet above the sea, is exhibited a fixed red light, visible 10 miles, but it can not be lighted in bad weather.

Barletta Road is superior to that of Bari. There is good anchorage northward of Barletta in depths of $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, mud and gravel, at from 1,600 yards to $1\frac{1}{2}$ miles from the lighthouse on the middle of the West Mole, or farther out in 8 or 9 fathoms, sandy bottom. This anchorage is frequented during the fine season, but is very dangerous with onshore winds.

At night anchor in from 7 to 9 fathoms water, with the occulting white light bearing about 217° , distant from 2 to 3 miles.

In clear weather vessels from the northward may recognize the position of Barletta by a high mountain, 14 miles 161° from the town, on the summit of which is a castle. Barletta is, moreover, the first town on the coast southward of Gargano Head.

Coast—Ofanto River.—The land in the immediate vicinity of Barletta is fertile, but beyond this commences the series of low beaches and marshy lands which border the Gulf of Manfredonia. At $3\frac{1}{2}$ miles northwestward of Barletta is the mouth of the Ofanto, the most easterly river of Italy. It rises in the Apennines near the town of St. Angelo de' Lombardi, and disembogues at the boundary of Capitanata and Bari Provinces, discharging a large amount of deposit. Fishing craft ascend this river when the bar at its mouth is least obstructed.

At 4 miles west-northwestward of the mouth of the Ofanto are the government salt marshes of Barletta; they are easily recognized by the large storehouses on the sea shore, off which in fine weather vessels may anchor at 2 miles from the land, in a depth of 7 or 8 fathoms, mud.

Ofanto River approach—Nonexistence of shoal.—The 3-fathom shoal, marked "D" on the charts, about $3\frac{1}{2}$ miles northwestward of the entrance to the Ofanto River, does not exist and should be expunged from the charts.

Margherita di Savoia, a small port, is situated about $3\frac{1}{2}$ miles west-northwestward of the mouth of Ofanto River.

Light.—Two fixed white electric lights, placed vertically a short distance apart, are exhibited at 26 feet above high water from a post, 20 feet high, at the end of the mole of Margherita di Savoia, visible 9 miles.

Lake Salpi.—From Barletta salt marshes to the town of Manfredonia, a distance of about 20 miles, the coast is low, sandy, and intersected by marshes, which render it unhealthful. The first is Lake Salpi, also called Salapina March, a sheet of water extending nearly $6\frac{1}{2}$ miles northwestward from the salt marshes of Barletta, and only separated from the sea by a narrow strip of sand, about the center of which stands the Pietre Tower. The mouth of the Carapella River is 7 miles northwestward of the Pietre Tower; its position is indicated by the Tower of Rivolo, 1,400 or 1,600 yards southeastward of the entrance.

The other lakes, fed by the waters of small streams flowing from the Apennines, and intersected by strips of land on which a few buildings may be seen, are not so large as Salpi. The most important are Salso Lake, which communicates with the sea by the same mouth as the Candelaro River, and the marshes of Sipontum, which

communicate with the sea by the St. Antonio Canal, 1 mile southward of Manfredonia. On the hill opposite are the ruins of ancient Sipontum.

Manfredonia.—The town of Manfredonia, founded in 1250 by King Manfred, occupies a pleasant site at the head of the Gulf of Manfredonia and at the foot of Mount St. Angelo; it is surrounded by walls, and is protected on the northeastern side by a strong castle. The town is in communication with the general railroad system of Italy by means of a branch line to Foggia, and, owing to its position, is the center of the trade of the province of Capitanata and the adjoining country; it contains a population of about 13,355.

Trade.—Manfredonia has building yards, storehouses, and a small hospital fitted for 20 patients. Marsh fever and ague are prevalent.

The exports are chiefly olive oil and dried fruits; the imports, coal, coffee, spirits, etc.

Harbor.—Its small and open harbor is on the southwestern side of a jetty which extends southward from an angle of the castle; the jetty has been extended and completed to a length of 620 yards from the shore in order to prevent the sand, washed up by easterly winds, from filling up the harbor. The jetty must be approached with caution, as there are depths of about $1\frac{1}{2}$ fathoms for 90 feet off it. The space close westward of the breakwater has been dredged to a depth of about 15 feet. The harbor is quite open to strong southerly winds and is then very dangerous.

Dredging is in progress in the inner part of the harbor. There are two mooring buoys in the harbor.

Supplies.—Fresh provisions, vegetables, and fish may be procured; also water from a fountain.

Lights.—An occulting white electric light is exhibited, at 67 feet above high water, from a white octagonal tower over a two-storied dwelling, 60 feet high, situated at the inner end of the mole, visible 14 miles.

A fixed green electric light is exhibited from a post on the outer extremity of the mole, visible 2 miles.

Centopozzi—Radio.—There is a radio station at Centopozzi (lat. $41^{\circ} 42' N.$, long. $15^{\circ} 37' E.$), about 15 miles west-northwestward of Manfredonia. It is open to the public from sunrise to sunset. The call letters are I.C.M.

Manfredonia Road, at the head of the Gulf of Manfredonia, affords the best anchorage on the eastern Italian coast, especially in a heavy bora gale. Vessels ride safely about 2 miles from the shore, in a depth of 6 to 7 fathoms, mud, with the town bearing 318° and Mount St. Angelo about 3° , or farther out in deeper water if desired.

During summer small vessels may anchor in 5 fathoms, mud, $\frac{3}{4}$ mile southeastward of the molehead.

When at anchor at the head of the Gulf of Manfredonia, the bora wind, called *Monterese* by the inhabitants, rushes down in violent squalls from the gorges of Mount Gargano Peninsula.

Manfredonia Road is exposed to winds from between south-south-east and northeast, but, however violent in the offing, the wind seldom blows hard near the land and the sea is never very heavy at the anchorage. A southwesterly wind sometimes blows in heavy squalls, but not for any length of time; it blows lightly almost every night, veers to the westward at daybreak, and remains in that quarter during the greater part of the forenoon.

Directions.—Mount Gargano Peninsula is lofty, with many isolated peaks, and is a useful guide for the anchorage in Manfredonia Road from whatever quarter it is approached. It is the first highland seen on the coast of Italy in coming from the Mediterranean. Mount Calvo, its highest peak, is 3,465 feet above the level of the sea, and Mount St. Angelo 2,900 feet. Near the summit of the latter is the town of that name. It has a tower with a semaphore and also a church.

In running from the northwestward for the anchorage in Manfredonia Road during a bora the coast of Gargano Head should be rounded at a short but prudent distance, taking care to be prepared for violent gusts from the highland.

In summer, if the wind is northwesterly outside, it will generally be found about east-northeast after passing the head. In winter, on the contrary, it hauls to the westward and comes down in violent squalls from the highland of Gargano. In such a case, a sailing vessel may have to tack. The land should be kept close aboard until nearing Manfredonia, when it should have a wider berth, and especially southward of that place, where the water shoals off some distance. Nearly 3 miles northeastward of the tower of Rivolo the depth is only $5\frac{1}{2}$ fathoms.

Mattinata.—The best anchorage for a vessel not wishing to stand far into the gulf is off Mattinata, eastward of Rossa Point and distant 2 miles from the point, in a depth of 6 or $6\frac{1}{2}$ fathoms, mud. This anchorage is 9 miles southwestward of the eastern extremity of Gargano Head; and, in addition to the lighthouse and semaphore on Rossa Point and the telegraph station on the hill about 660 feet above it, a tower on the shore $\frac{3}{4}$ mile to the northward will be seen, and also the town of Mattinata inland, in the midst of cultivated land.

There is also anchorage off any part of the coast between Mattinata and Manfredonia in the same depth of water, at no greater distance from the land. Should the force of the wind compel a vessel to bring up farther off, the anchor should be dropped within 3 miles of the land and southward of Mattinata, where about the same depth

of water, mud bottom and good holding ground, will be found. This anchorage is often used by naval vessels.

Nearly midway between Manfredonia and Rossa Point and extending about $\frac{1}{2}$ mile from the shore there is a shoal patch of $2\frac{1}{2}$ fathoms.

Light.—A fixed white light is exhibited, at an elevation of 51 feet above the sea, from a tower with square base and dwelling, 21 feet high, on Punta Agnuli, $1\frac{1}{4}$ miles northeastward of Rossa Point. The light is visible 11 miles. (See Light List.)

Semaphore.—There is a semaphore station on Rossa Point.

Gargano Head.—Between Manfredonia and Gargano Head the coast is everywhere high and mostly inaccessible. The eastern part of Mount Gargano Peninsula presents a face about 11 miles in breadth. The coast is high and perpendicular toward the sea and may be approached to within 1 mile or more according to wind and weather. The head is the most easterly projection, high and steep toward the sea. Southward of the head are the Campi and other towers, and northward of the former is the little islet of Campi. Farther northward, between the head and Vieste, are the towers of Felice and Gattarella and the Islet of Portonovo surrounded by rocks.

Southward of Vieste is a low and open beach off which vessels may anchor temporarily in depths of from $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, hard mud. This anchorage, which is sheltered from westerly winds, may be used by vessels seeking shelter from that quarter, but the anchor should be weighed immediately the wind begins to abate.

Port Vieste, nearly 4 miles northward of Gargano Head, is situated between two projecting points; Santa Croce Islet, 165 yards off the northern point, protects it in some measure from the northeastward, and thus forms a small natural harbor, which has generally from 8 to 12 feet water; near the islet, however, which is surrounded by a bank, the depth is from 20 to 23 feet. The depth increases seaward both northwestward and southeastward of Vieste, and here vessels may anchor with offshore winds.

The port is open to the eastward and the current runs with considerable strength at times. Coasting vessels make fast to Santa Croce Islet, westward of which there are two mooring buoys.

Town.—The small town of Vieste stands on a rocky point on the southern side of the harbor, close to the sea, and at the foot of Mount Gargano. It is built in the shape of an amphitheater and may be recognized by its isolated position, by a fort on which is the semaphore, by a steeple which overlooks the town, and on the north by Santa Croce Lighthouse. The borgo or suburb stands on the shore between the two points of the bay. Small supplies may be obtained.

Light.—A flashing white light is exhibited, at 132 feet above high water, from a white octagonal tower over a two-storied dwelling,

90 feet high, on Sta. Croce Islet, and should be seen from a distance of 17 miles. (For the arc of visibility, see Light List and Chart.)

Daymark.—The tower of Santa Croce Light, with the name "Vieste" painted on it in large black letters, may be distinguished at a distance of about 550 yards.

Semaphore.—Vieste semaphore, situated on the fort, is connected with the telegraph system.

The coast, from Port Vieste, trends round northwestward 9 miles to the village of Peschici, and, although there are sandy beaches, it is generally difficult of access even to fishing boats. The most conspicuous objects are the Monticello, Porticello, and Spinale Towers and the projecting point and tower of Calalunga. The land may be approached to the distance of 1 mile, bearing in mind that the current sets toward it.

Peschici is a small village on a picturesque height perpendicular toward the sea. There is indifferent anchorage for coasters westward of the village in a depth of $2\frac{1}{2}$ or 3 fathoms, mud.

Rodi.—At 6 miles westward of Peschici is the town of Rodi, on an advanced and precipitous hill; it occupies a beautiful position amidst gardens and olive trees. A pier which formerly protected the small harbor of Rodi against northerly winds was destroyed by the sea. Coasting vessels generally anchor $\frac{1}{2}$ mile offshore, but the anchorage is not good. The town may be recognized by Ischitella Church steeple on an eminence above it.

A mole has been constructed at Rodi.

Lights.—A fixed red light is exhibited, at 39 feet above high water, from a masonry hut on the point northeastward of the town, visible 6 miles; it is unwatched.

The extremity of the mole is marked by a fixed white light.

Supplies.—Provisions and water may be obtained. A large trade is carried on in oranges, lemons, almonds, etc.; timber for shipbuilding is procured from the forests of Gargano.

Anchorage.—Between Peschici and Rodi the 5-fathom curve is 1 mile offshore in places. Vessels of deep draft may anchor between Peschici and Rodi, at $1\frac{1}{2}$ miles or more from the shore, in a depth of about 10 fathoms, sheltered from a southeasterly gale and from all offshore winds. This anchorage may be useful to a vessel bound out of the Adriatic overtaken by a strong southeasterly wind and unable to round Gargano Head, but it should be abandoned at the slightest symptoms of a northerly breeze.

There is a heavy breaking sea during sirocco winds, which makes the anchorage unsafe and exit from the port dangerous; it is therefore advisable to quit the anchorage as soon as sirocco sets in. The anchorage is also unsafe in any bad weather.

The Tremiti Islands, so called from the frequency of earthquakes in former times, lie 20 miles northwestward of Rodi, are four in number, almost uncultivated, and produce nothing but a little oil and firewood. They are low by comparison with the high land of the main, the highest point being a hill elevated 377 feet above the sea. Their shores, especially on the northern side, are generally steep and inaccessible; they cover an extent of nearly 3 miles northeast and southwest by a width of about 1,400 yards, and the soundings close round them are deep, varying from 17 to 35 fathoms. The only water is in the well of the fort at the southwestern end of San Nicola Island. They are in telegraphic communication with the mainland by means of a submarine cable between San Nicola and Mileto Point.

San Domino, the largest and southwestern island of the group, is 1.3 miles in length and about 1,400 yards long in breadth. It is the highest of the group, the hill before mentioned rising at its southwestern part.

Cretaccio, the smallest islet, is about 400 yards in length and lies 150 yards from the northeastern end of San Domino; at its eastern end is La Vecchia, a large rock awash. There is no passage between San Domino and Cretaccio, nor between the latter and La Vecchia.

San Nicola the southeastern island, is steep, rocky, and 1,700 yards in length; at its southwestern end is a large building formerly a convent, a fort, the semaphore, a small pier for boats, and the landing place.

The passage between San Nicola and La Vecchia is fit only for vessels of light draft, as not more than 15 feet water can be carried through; a depth of 6 feet was reported to exist (1907) near the middle of the passage, and local knowledge therefore appears to be necessary for vessels using it.

Caprara, the northeastern island, is steep on its northern side, gradually slopes to the southward, and is separated from San Nicola by a passage about 300 yards wide; vessels using this passage should keep in mid-channel.

There is a passage between San Domino and Cretaccio Islands about 100 yards wide, with $1\frac{1}{2}$ fathoms water.

Mooring buoys.—A mooring buoy is placed about 200 yards northwestward of the southwestern point of San Nicola Island, and another about 250 yards northward of the same point.

NOTE.—(1916) Mooring buoys carried away; will probably be replaced.

Telegraph cable.—The submarine cable connecting the Tremiti Islands with the mainland at Mileto Point, leaves the southeastern coast of San Nicola immediately below the semaphore. Its direction on leaving the shore is about 176° and is marked by two beacons.

Semaphore.—There is a semaphore station on the fort at San Nicola Island.

Anchorage.—The anchorage at the Tremiti Islands gives sufficient shelter from a bora gale, and is also convenient for vessels desiring to reach Manfredonia Road, but unable to round Gargano Head.

A vessel of deep draft should anchor off the southeastern coast of San Domino, about 600 yards from the shore, in depths of from 17 to 35 fathoms, mud bottom, and good holding ground. The nearer a vessel approaches the southwestern end of San Nicola, the better the shelter from a bora.

Small vessels anchor sufficiently near San Nicola, to make fast to some strong posts under the fort; or, between San Nicola Fort and San Domino, securing to posts on Cretaccio; they also anchor between Cretaccio and San Domino, and run a hawser out to each island. The last anchorage is preferred, as it affords the best security against a bora.

Vessels should avoid anchoring in the vicinity of the telegraph cable, which leaves the shore of San Nicola below the semaphore, as described above.

The anchorage northward of San Nicola is more exposed and not so convenient for getting under way; vessels have also to avoid a rocky patch of $4\frac{1}{2}$ fathoms lying nearly 200 yards from the southwestern point of Caprara Island, and also a rocky bank, covered with only 4 feet water, about the same distance northeastward of Cretaccio.

Coasters sometimes seek shelter from southeasterly gales in Turchi Cove, a small creek on the northwestern side of Caprara Island.

Lights—Caprara Island.—Near the northeastern end of Caprara Island is a white octagonal tower 51 feet high, above a yellow dwelling, from which is exhibited, at an elevation of 118 feet above the sea, a white fixed light, visible 14 miles. (For arc of visibility see Light List.)

Diavolo Point.—Near Diavolo Point, at the southwestern end of San Domino Island, from an octagonal turret on a large white house and at an elevation of 159 feet above the sea, an occulting white light is exhibited. The light is visible 9 miles. (See Light List and Chart.)

San Nicola Isle.—From an octagonal structure, 14 feet high, on the southwestern side of San Nicola Castle, at an elevation of 43 feet above the sea, is exhibited a small fixed white light, visible 6 miles.

Directions.—As there is no good harbor between Ancona and Manfredonia, and sailing vessels are often driven to leeward by bora gales, which at times blow for 4 or 5 days, more or less, and with great violence, the anchorage at the Tremiti Islands is in such cases recom-

mended; here shelter is afforded with the wind from about northeast, through north to west by south. With the wind from the northward, a vessel should pass eastward of the islands and along the southern side of San Nicola as near as convenient, for the anchorage at its southwestern end; there is more than 30 fathoms water close-to.

Pianosa Isle, 50 feet in height, situated $1\frac{1}{2}$ miles 62° from the northeastern extremity of the Tremiti Islands, is a low, flat arid rock depressed toward the southward, but rising a little on its northern side. It is nearly 800 yards in length and about 300 yards in breadth; the northern side is steep-to at the distance of 100 yards and the southern side is foul more than 400 yards off. The currents in its locality are at times strong and uncertain in direction, and it should therefore be given a berth in a sailing vessel.

Light.—A flashing white light is exhibited, at 67 feet above high water, from a metal trellis tower located 308 yards 307° from the signal on the summit of the island. The light is visible 13 miles and is unwatched.

Pelagosa Isles, two in number, Grande and Piccola, are nearly in the middle of the Adriatic, about 25 miles 66° from Pianosa Islet.

Pelagosa Grande is an uncultivated rock rising perpendicularly toward the southward, but less steep on its northern side; it is 1,500 yards long east and west and 300 yards wide, with its highest part 343 feet above the sea, toward the west. The Manzi Rock, 8 feet high, and other rocks level with the water, with the Pampano Rock at their extremity, extend 334 yards from its western point. At the northwestern end of the islet, is a small cove where fishermen haul up their boats in bad weather.

Pelagosa Piccola, 127 feet high and 500 yards in length, is off the eastern end of the larger islet and is surrounded by other rocks and islets to the distance of more than 200 yards.

The position of Pelagosa Grande in the middle of the Adriatic, and about midway between Gargano Head and Lagosta Island, renders it a good point of departure for vessels navigating the Adriatic during the fine season. They should, however, always avoid approaching it closely, especially at night or in thick weather, on account of the currents, which are very irregular in its vicinity.

Light.—On the highest part of Pelagosa Grande is a tower above a two-story dwelling, 74 feet high, from which is exhibited, at an elevation of 359 feet above the sea, a fixed and flashing white light. The light is visible 26 miles. (See Light List.)

Cajola Rock lies 3 miles 102° from Pelagosa Piccola; it is about 17 feet high and barely 200 yards in length. At 600 yards eastward of Cajola Rock is the Pampano, a narrow rocky ledge about 1,400 yards in length, the center of which breaks. On account of the cur-

rent, it is imprudent for a sailing vessel to pass between Pelagosa and Cajola Rock, although the channel is wide and deep.

Coast.—Westward of Rodi commences a long uniform sandy beach, which extends almost uninterruptedly for about 150 miles, as far as Mount Conero, near Ancona. From Rodi to the mouth of the Tronto River, a distance of nearly 120 miles following the coast line, although the coast is not very populous and is mostly only cultivated in the vicinity of towns, provisions may be obtained in abundance, especially fresh water, which is everywhere supplied by numerous torrents descending from the Apennines; but there is not a single harbor wherein a vessel may obtain shelter. The water shoals for 600 or 800 yards from the shore, over a bottom of sand or gravel; farther off, the bottom is mud, or mud and sand.

In fine weather the whole of this portion of the Italian coast may be ranged along at the distance of a long mile in depths of from 6 to 10 fathoms; attention being paid to the lead. With offshore winds, or, in fine weather, even with southeasterly winds, vessels may anchor in the offing, at the distance of 2 miles from the shore, in good holding ground.

Anchorage.—The following is a brief description of the principal anchoring places for coasters:

Mileto Point.—Nearly 10 miles westward of Rodi is Capojale Point, the termination of a long sandy shore named Varano Wood, and 2 miles westward of it is Mileto Point and tower. The coast between these two points and for 1 mile westward is rocky, rather high, and precipitous. Mileto Point is remarkable for its projection northward between two long sandy beaches, and as terminating a chain of heights separating the two great lakes of Varano on the east, and Lesina on the west.

Telegraph cable.—The submarine cable communicating with San Nicola, Tremiti Isles, leaves the shore at Mileto Point, southeastward of the semaphore in a bay below the Trappeto del Principe. A beacon with a notice board, 10 feet from the sea, marks the spot where the cable is landed. From thence it is laid 3° for 340 yards, and then 338° .

Varano and Lesina Lakes.—These lakes, which are only separated from the sea by low narrow strips of sand, overgrown by forests of beach and oak trees, communicate with it by two small channels inaccessible even to fishing boats. The only trade carried on in the neighboring villages and in the town of Lesina, near the southwestern extremity of the lake of this name, is in fish, with which the lakes abound.

Railroad.—The Adriatic coast line railroad, which quits the neighborhood of the shore westward of Barletta and passes west-

ward of all the highland of Gargano, again approaches the coast near the western end of Lesina Lake, crossing the Fortore River about $1\frac{1}{2}$ miles inland, and from thence keeps close to the coast the whole of the distance to Rimini.

Fortore River (ancient Frento or Frentone) rises in the woods of Mazzocco, at Mount Chilone, and its mouth, which is $15\frac{1}{2}$ miles westward of Mileto Point and $2\frac{1}{2}$ miles beyond Pietre Nere Point, may be recognized by a large tower-shaped storehouse on the beach. Small craft, drawing about 4 feet, can ascend the river when the changing positions of the shallow banks at its mouth leave the pass free.

Anchorage.—Vessels anchor $1\frac{1}{2}$ miles from the shore, northward of the mouth of the Fortore, in a depth of about 11 fathoms, sandy bottom, with the storehouse at the mouth of the river bearing 183° . This, however, is a bad anchorage with northeasterly and northerly winds, as they raise a heavy sea and accelerate the currents; but it affords tolerable anchorage with easterly and southeasterly winds, an advantage not possessed by any of the anchorages to the westward as far as Ancona. The position is known by the storehouse, in which the produce of the interior, especially the corn destined for exportation, is deposited. Coasters obliged to remain any length of time at this anchorage moor their vessels securely, the crews going on shore at sunset to avoid being wrecked in them, in the event of a heavy Bora.

Campomarino.—From the mouth of the Fortore the coast is low and almost entirely covered with the woods of Santa Agata Maresca and Ramitello; the shore all along is a sandy beach, the only remarkable objects being the towers of Mozza and Saccione, the latter near the mouth of a small river of the same name, and then the tower and village of Campomarino, standing on an elevation near the shore and surrounded by a fertile plain. Campomarino is near the right bank at the mouth of the Biferno River, and is on the coast line railroad. The Biferno River has its source at the foot of the mountains of that name near Boiano, and flows into the sea through marshes and low sandy land; fishing boats are able to ascend it when the waters are swollen.

Anchorage.—Vessels may anchor off Mozza Tower in a depth of 9 or 10 fathoms, northeastward of a mountain inland which will be seen between Mounts Lesina and Termoli. There is also an anchorage off Campomarino, in 8 to 6 fathoms, at a fair distance from the shore; small craft can ascend the Biferno River under the same conditions as at Fortore. At about $5\frac{1}{2}$ miles south-southwestward of Termoli is the town of San Martino, standing on a hill 912 feet above the sea.

Termoli.—This town stands on a projecting rocky point $3\frac{1}{2}$ miles northwestward of Campomarino; it is on the coast line railroad, is small, fortified, and contains a population of about 2,000. Small supplies and water may be obtained.

Anchorage.—Vessels anchor off Termoli at about $1\frac{1}{2}$ or 2 miles northward or northeastward of the town, in depths of from 9 to 12 fathoms, mud. This anchorage is, however, very inconvenient with easterly and northerly winds, and sailing vessels should stand off the land if the wind comes from these quarters.

Coast.—The coast from Termoli bends round northwestward and northward for 18 miles to Penna Point, and is a wooded desert, with the exception of the town of Vasto, standing at the turn of the bend; but, being low and bordered by a sandy beach as far as Vasto, coasting boats are enabled to approach it and haul on shore in case of need. The interior of the country is high and mountainous. Numerous rivers and torrents discharge their water into the sea between Termoli and Vasto, and some rocks lie here and there near the shore between Vasto and Penna Point. The Trigno, the position of which is shown by Montebello Tower on its right bank, is the only important river, being navigable for small craft when the banks at its mouth admit of their crossing the bar.

Anchorage.—The anchorage off Petacciata is 8 miles southeastward of Vasto, in a depth of 6 and 7 fathoms, good holding ground. This is a tolerable anchorage with an onshore wind, the sea being broken before reaching it. When running for this anchorage a vessel should steer for the land between Termoli and Penna Point, toward a large wood, anchoring about 1 mile or $1\frac{1}{2}$ miles from the shore.

Vasto.—This town is on high land at the bend of the coast between Termoli and Penna Point. It is on the coast-line railway, is fortified, and has a population of about 14,000. The neighborhood is well cultivated. Water and provisions are in abundance.

Anchorage.—Vessels anchor in depths of from 7 to 9 fathoms, mud bottom and good holding ground, about 3 miles northeastward of the town. They generally moor with open hawse to the eastward, and by backing their anchors are able to hold on with a strong breeze from east or east-northeast if unable to get under way. Small coasters anchor nearer the town, about 1 mile from the shore.

Penna Point.—The coast between Vasto and Penna Point is rocky, high, and inaccessible, on account of the rocks by which it is bordered. The point itself is composed of dark rocks and is easily known by its projection to the northeastward, also by a church, by a semaphore tower on its highest part, and by a large building a little inland.

Light.—A fixed and flashing white light is exhibited, at 279 feet above high water, from an octagonal tower, 199 feet, on Penna Point. The fixed light is visible 13 miles and the flash 23 miles.

Sangro River.—From Penna Point to the mouth of the Sangro River the shore is sandy, and, with the exception of the Aderico Rocks near the tower 1 mile westward of the point, is everywhere accessible. Amongst the numerous streams which reach the sea on this coast, the Sangro is the only one of any importance. It takes its rise in the mountains near Lake Celano, and falls into the sea at Turino Wood, $8\frac{1}{2}$ miles northwestward of Penna Point. A tower on the right bank marks its mouth. It is navigable for small craft when the entrance is open, and the railroad crosses the river near its mouth.

Northwestward of the Sangro, as far as the tower at the mouth of the Feltrino River and the small village of St. Vito, the coast is everywhere bordered by rocks, but between the latter and Ortona, where two rivers rising at the foot of Mount Majella reach the sea, it becomes low and accessible. St. Vito stands rather high, almost at the margin of the sea, between two well-cultivated hills.

Ortona.—The town of Ortona is about $17\frac{1}{2}$ miles northwestward of Penna Point. Its position may be easily recognized from the sea by Mount Majella, whose summit is 9,159 feet above the sea, an enormous round mass 22 miles southwestward of the town. The church steeple of Chieti and the various buildings of Ortona will be seen on nearing the coast. The town is on the main coast railroad line, is surrounded by walls, and contains many large buildings. Its population, chiefly fishermen, is about 12,000. The environs are well cultivated. Provisions and cistern water are easily obtained.

Harbor.—From the point on which the town stands a projection surrounded by rocks extends northeastward about the distance of 200 yards. The small harbor of Ortona is formed and the anchorage sheltered from northerly winds by a breakwater extending about 260 yards 138° from this rocky projection; thence 355 yards 110° .

The mole will be still further extended about 306 yards in the same direction and thence in a 140° direction for about 393 yards. (1916.)

A new mole is being constructed about $\frac{1}{2}$ mile southward of the city, just northward of Saraceni Tower. It extends 109 yards in a northeastern direction.

The greatest depth of water under shelter of the breakwater at present is only from 6 to 12 feet sandy bottom; the harbor is therefore only available to small craft. There is a mooring buoy about 200 yards southward of the end of the old part of the breakwater.

There is indifferent anchorage 1 mile from the land eastward of the town.

Light.—An occulting green light is exhibited from an iron mounting on a hut erected on the mole about 160 yards from the extremity of the new work.

Caution.—Vessels must give a berth of at least 400 yards to this light to avoid the extension works.

Wreck.—The wreck of the steamer *Selinunte* lies sunk in Ortona Harbor in line with the prolongation of the mole.

Coast—Francavilla.—At about 6 miles northwestward of Ortona is Francavilla, a somewhat remarkable village, containing a population of about 2,600. It is near the margin of the sea on a small eminence surrounded by well-cultivated lands. The shore between the towns is low and sandy, the only remarkable objects being the tower of Mucchia and those at the mouths of the Ariello and Foro Rivers.

Pescara River, which separates the two Abruzzi, has its source in the mountains which surround the town of Aquila, winds round the Gran Sasso d'Italia, passes Chieti, and falls into the sea, after flowing through the town of Pescara. It divides the town into two parts and is much frequented by coasters, which carry on the trade of the Abruzzi Provinces. It is the safest little harbor on the coast, has a depth of $6\frac{1}{2}$ feet, and can accommodate about 30 small vessels, which make fast to posts on the banks.

The town of Pescara is 4 miles from Francavilla and stands in a plain. It contains a population of about 2,000, is fortified, and is on the Adriatic coast line railroad. Boats are built for the coasting trade. Small supplies can be obtained, but the water is bad.

Moles.—A mole extends from the northern side of the entrance to Pescara River and a mole is in course of construction from the southern side.

Lights.—A fixed red light is exhibited, at 16 feet above high water, from an iron mounting, 21 feet high, on the outer extremity of the southern mole, and a fixed green light is exhibited, at 16 feet above high water, from an iron mounting, 21 feet high, on the outer extremity of the northern mole.

Anchorage.—There is anchorage about $1\frac{1}{2}$ miles off the mouth of the Pescara River, in a depth of 6 to 8 fathoms, mud bottom, and good holding ground, with the tower at the mouth of the river bearing 239° , or 1 mile farther out in 9 or 10 fathoms.

Giulianova.—A groyne breakwater is under construction to protect the Giulianova foreshore between the Tordino and Salinello Rivers. About 109 yards have been built, and when completed the groyne will have a total length of 175 yards, a height of 10 feet, and a width of 19 feet on its upper portion.

Landmark—Gran Sasso d'Italia (Mount Corno).—The position of Pescara or any other place on the whole of this part of the

coast may be easily known by a bearing of this mountain, whose summit lies $271^{\circ} 29'$ miles from the entrance of the Pescara River. It is the most elevated mountain in the neighborhood, being 9,560 feet high and may be distinguished from others by its summit being divided into two pyramidal peaks of similar shape. The range on which it is situated extends some 10 miles eastward of it.

When bound to Pescara from the northeastward, vessels should steer in for the land midway between Mounts Majella and Corno until the fortress of Pescara is seen, which is low and visible only at a short distance.

Coast.—From Pescara River, westward of which is a large pine forest, to the Tronto River, 29 miles to the northward, the coast is low, sandy, and thinly inhabited, owing to the unhealthfulness of its marshes. The most remarkable objects are: The village and castle of Silvi, on an eminence 8 miles from Pescara; Cerrano Tower; the steeple of Atri Church, 1,627 feet above the sea and about $4\frac{1}{2}$ miles inland; the town of Mutignano, 2 miles from the coast and 1,100 feet above the sea; Montepagano; the village of Giulianova, on an eminence 1 mile northward of the mouth of the Tordino River; and the town of Tortoreto, on a hill between Giulianova and the Tronto.

This coast is intersected by many small streams and by seven rivers—the Salino, the Cerrano, the Calvano, the Vomano, the Tordino, the Salinello, and the Casone. These are of but little importance, and with the exception of the Salino and the Vomano, which fishing boats occasionally ascend, they all become dry in summer. Each gives rise to an accumulation of deposit at its mouth.

Anchorage.—In fine weather sailing vessels may anchor at $1\frac{1}{2}$ miles from any part of this coast, in a depth of 6 or 7 fathoms, mud, and may safely range along it at from that distance to $2\frac{1}{2}$ miles unless the wind blows right onshore.

Boats engaged in the coasting trade anchor abreast of Silvi and Giulianova, beaching their boats in case of need, except near Cerrano Tower, in front of which it is said to be rocky.

Tronto River rises at the foot of the Sibillini Mountains, flows past Ascoli, and falls into the sea between two towers at its mouth. There is a depth of about 3 feet at its entrance at high water, at which time small coasters ascend it for about $\frac{1}{2}$ mile, passing with difficulty between the banks by which it is obstructed.

Colonella.—The town of Colonella stands on a hill 1,095 feet high, 3 miles southwestward from the mouth of the Tronto, and is a good mark for its position.

Semaphore.—A semaphore, surmounting a large tower, painted black and white in squares, is situated about $1\frac{1}{2}$ miles southward of Tronto River Entrance.

CHAPTER IV.

TRONTO RIVER TO PORT BUSO.

Coast—General remarks.—From the Tronto River to the mouth of the Po di Goro the distance following the coast line is about 144 miles. Between the Tronto and Mount Conero, near Ancona, the coast is generally low and sandy; hills occur at long intervals in continuation of the Apennines, but do not reach within $\frac{1}{2}$ mile of the shore except between Marona and San Giorgio, the port of Fermo, where the shore is steep. These hills form a pleasing contrast with the beach, being well cultivated and dotted with towns and villages.

At Rimini the coast suddenly becomes uniformly low and sandy and so continues to Maestra Point and beyond it throughout the whole of the Gulf of Venice and part of the Gulf of Trieste for 11 or 12 miles beyond the Austrian frontier at Port Buso. Between Rimini and Cervia towns and villages are visible in the midst of a large cultivated plain; but beyond the latter town the coast is intersected by marshes, and inland is the largest pine forest of Italy, extending from Ravenna to Primara.

The rivers and numerous streams which run into the sea northward of Ancona, bring down a great quantity of soil, causing a gradual extension of the land seaward. The banks thus formed vary so often in shape and extend so far off that it is not prudent for vessels to approach the shore in bad weather. Where the land is high rocks here and there border the shore and render it difficult of access even to boats.

Anchorage—General remarks.—These anchorages are described in detail in the following pages.

Small vessels may anchor anywhere between the Tronto River and Cesenatico, $\frac{1}{2}$ mile offshore, especially in front of the towns and villages; and, between Cesenatico and the southern mouth of the Po di Tolle, about 35 miles northward of it, at $1\frac{1}{2}$ miles from the shore; but all these anchorages, though good with offshore winds, are dangerous with others and care should be taken not to be surprised by them. In case of need, vessels of deep draft may anchor about 3 miles from the shore, where good holding ground of hard mud will be found. Between the Tronto River and Mount Conero, the anchorages are only good with offshore winds or in fine weather. On coming to an

anchor by night or in foggy weather along this part of the coast of Italy, it is necessary that the lead should be kept going, care being taken not to stand into a less depth than from 9 to 12 fathoms.

Between Sirolo and Ancona the coast is high and perpendicular, with moderately deep water close-to, and vessels should not anchor here except in case of necessity. Between Ancona and Rimini the high lands of the Apennines decline to within about $\frac{1}{4}$ mile of the coast, and, in some places, as at Ancona and Pesaro, to the margin of the sea.

Off the coast between Ancona and Maestra Point, in addition to the precaution of not approaching the shore too near, it is necessary to ascertain by the lead the quality of the bottom should a vessel bring up, for anchors frequently drag, particularly between Rimini and Maestra Point, on account of the great hardness of the clay.

Between the Tronto River and Maestra Point, Ancona Harbor is the only place really deserving the name of a port and capable of admitting vessels of moderate draft. All the rest, formed chiefly by mouths of rivers, are scarcely available for coasters, and are, moreover, difficult of access.

The following is a brief description of them, and of the towns and villages off which vessels anchor.

San Benedetto is a town partly situated on a hill near the sea $3\frac{1}{2}$ miles northward of the mouth of the Tronto; it contains a population of about 7,000.

There is a mole here, 200 yards long.

Light.—A fixed white light is exhibited, at 18 feet above high water, from a mast on the mole. It is unwatched.

A fixed electric light, exhibited 41 feet above the sea from a wooden structure, is erected as a guide to the anchorage. The light is located about 110 yards southward of the root of the mole and about 330 yards from the light on the extremity of the same.

A light is also shown from a wooden support on the shore about 100 yards southward of the root of the mole.

Grottamare.—At 3 miles farther northward is the village of Grottamare, on the slope of a small hill, at the foot of which stands another village; the latter may be recognized at some distance by the tall belfry of a convent. The mouth of the Tesino, a small river of no importance, is between Grottamare and S. Benedetto.

Marano.—Nearly 2 miles northward of Grottamare is Marano, another village on the summit of a small hill not far from the sea.

These three villages, off which coasters anchor, are populous and carry on a considerable inland trade. The coast between the Tronto River and Marano is bordered by a bank extending about $\frac{1}{4}$ mile off-shore and in some places by breakers which do not allow even boats to approach except in fine weather. A vessel's position may be known

when standing in by a bearing of Mount Vettore, 8,123 feet high, which lies $250^{\circ} 27$ miles from Grottamare. This mount forms a part of the Apennine chain and is easily distinguished by its barren summit, and by several whitish peaks at a short distance from each other.

Pedaso.—This small village, about $4\frac{1}{2}$ miles northward of Marano and on the right bank of the mouth of the Aso River, is another place of some commercial importance. The river, off which coasters anchor, rises at the foot of the Sibillini Mountains; it is capable of receiving small craft in fine weather and when the sand banks formed at its mouth permit.

Light.—A flashing white light is exhibited, at 164 feet above high water, from an octagonal tower and dwelling, 60 feet high, on the coast $\frac{1}{2}$ mile southward of Pedaso, visible 19 miles. The name "Pedaso" is painted in black on the lighthouse.

Fermo.—The town of Fermo, which may be recognized by a remarkable dome, is on an eminence 1,197 feet high, $6\frac{1}{2}$ miles from Pedaso and nearly 4 miles from the sea. Vessels anchor off the village of San Giorgio, which may be considered as the port of Fermo, and is eastward of that town; the beach on which the village stands is lower than any other part; like the rest of these places, it is only approachable in very fine weather on account of the banks bordering it; the 5 fathoms curve of soundings, is about 1 mile from the shore.

The Lete, a small river of no importance, disembogues 1 mile southward of San Giorgio, between it and the small village of Palma, which is on high land to the southward. At $3\frac{1}{2}$ miles northward of San Giorgio is the Tenna, a small river accessible to boats occasionally in winter. This river taking its rise in the Sibillini Mountains, is very rapid in spring and autumn when the mud brought down by it is carried out to a considerable distance.

San Elpidio.—This village is $1\frac{1}{2}$ miles northward of the mouth of the Tenna, and is the port of the town of San Elpidio, which, with its castle, stands $3\frac{1}{2}$ miles westward of the village on a hill 930 feet high, which is a good mark in making the land. Coasters anchor off some large storehouses on the beach.

Chienti River.—This small river takes its rise in the Apennines, runs past Tolentino and Macerata, and after a course of 5 miles flows into the sea between San Elpidio and Civitanuova. Fishing boats enter its mouth at high water.

Civitanuova.—The port of Civitanuova is 3 miles northward of the village of port San Elpidio and $2\frac{1}{2}$ miles eastward of the town of Civitanuova, which stands on a hill 590 feet high and occupies the site of the ancient Novana. The anchorage off the village forming the port is much frequented on account of the central position of Civitanuova in a rich, populous, and well-cultivated country.

Coasting vessels are built here and provisions and water are to be obtained.

Potenza Picena.—At $3\frac{1}{2}$ miles northward of Port Civitanuova is a village which is the port of Potenza Picena or Montesanto, which town contains a population of about 16,000, stands on a hill 915 feet high and 3 miles from the beach. Vessels anchor off the village close to the shore southward of the tower. At $\frac{1}{2}$ mile southward of the tower is another tower at the mouth of the Asola, a small river unnavigable by reason of the mud banks at its entrance.

Recanati.—On the beach, $4\frac{1}{2}$ miles, northward of Port Potenza Picena, is the village of Port Recanati. Coasters anchor off some large storehouses at the village, where they can haul on shore if necessary. The large town of Recanati stands on high land 1,056 feet above the sea and 5 miles inland. The dome and tower of Loreto, on a hill 603 feet high and $2\frac{1}{2}$ miles northwestward of the village, is a good mark for this anchorage.

Two unimportant rivers, the Potenza and Musone, issue near the village of Port Recanati; the former about $\frac{1}{2}$ mile southward, the latter $2\frac{1}{2}$ miles northward of it.

Numana and Sirolo.—At $5\frac{1}{2}$ miles beyond Port Recanati, and in the bight formed by the coast trending northeastward under the southern slopes of Mount Conero, are the villages of Numana and Sirolo. The latter is on a hill by the sea; in case of need vessels may anchor off it in a depth of $6\frac{1}{2}$ fathoms, mud, sheltered by the base of the mountain from offshore gales between north and southwest.

Mount Conero.—The coast changes suddenly in aspect at Sirolo, where it rises and forms the great elevation known as Mount Conero or Ancona, the most striking headland for many miles on this part of the coast. Mount Conero rises almost perpendicularly from Mezzaluna Point, and between this point and Ancona Lighthouse the range of hills, under various names, presents a front of about 7 miles in a northwest and opposite direction, Mount Conero at the southeastern extremity of the range being 1,877 feet high and double the height of any other part. On it stands an isolated telegraph tower (not in use), which serves to mark the mount at a great distance from whatever quarter it may be approached; a convent stands $\frac{1}{2}$ mile southeastward of the tower. The mountain becomes gradually depressed to the northwestward, where it terminates in Mount Guasco, a truncated conical hill on which are numerous buildings and the cathedral of St. Ciriaco.

Anchorage.—A sailing vessel overtaken by a southwesterly gale and finding it impossible to carry canvas may seek temporary shelter on the northeastern side of Mount Conero about $\frac{1}{2}$ mile from the land, where there is good holding ground. This wind, however, does

not generally last long and the vessel should weigh when it commences to abate.

Port Nuovo is $2\frac{1}{2}$ miles northwestward of Mezzaluna Point. This little harbor affords a safe shelter to fishing boats and others unable to reach Ancona. It is protected from northerly winds by Il Trave, a ledge of rocks which extends about 900 yards in a southeasterly direction from the shore. Some of these rocks are awash and mooring posts show their position. The first 600 yards of the ledge is mostly from 1 to 2 feet above water, the remainder from 1 to 5 feet under water. The entrance is between the eastern extremity of the ledge and Battery Point, which is skirted by rocks and shallow water. The general depths in the harbor are 4 and 5 fathoms, gravel bottom.

The harbor is open to the southeastward, and as it is mostly frequented with westerly winds caution is necessary in approaching the land under sail, as from this quarter the wind rushes down off the high land in dangerous squalls.

St. Clemente Rocks.—Between Port Nuovo and the western extremity of the base of Mount Conero are some rocks awash, which should be carefully avoided by a vessel working along the coast and standing close inshore under Mounts Della Croce and Padrone, and the St. Clemente Rocks above water lie off Ancona Point at the foot of Mount Guasco. There is no passage between these latter rocks and the point, and it is always prudent to give them a wide berth, as the current is strong in their neighborhood. The Volpe, above water, is the outer northwestern rock of the group and is marked by a slender iron beacon 20 feet high; it bears 337° , distant 400 yards from Fort Monte-Marana flagstaff. These rocks are surrounded on their southeastern and northwestern sides by rocky shoals awash.

Ancona.—This town is built on the sloping land, remarkable for the whitish appearance of its soil, between Mounts Astagno and Guasco, two hills of no great height. On Mount Astagno, the southernmost hill, stands the citadel in the form of an amphitheater, commanding the town and harbor, and on Mount Guasco, as before stated, is the cathedral of St. Ciriaco.

The town is ancient, but has great modern improvements and is well fortified. It is on the Adriatic coast line railroad and has almost the whole of the commerce of this part of the Adriatic. There are in Ancona and its neighborhood many sugar refineries, silk reeling mills, paper mills, and tobacco factories, the quantity of tobacco grown in the Province being much larger than that imported.

On the inner part of the mole is one of the finest remains of antiquity, the triumphal arch erected by Trajan, A. D. 112.

Population.—Ancona contains a population of about 56,835.

Communication.—Ancona is in direct railroad communication with Rome, Naples, Bologna, and Florence, and by frequent steamers with Trieste, Venice, Brindisi, Egypt, etc.

Hospital.—There is a large roomy hospital here at which seamen are received by consular request, and are maintained at a small charge.

Trade.—The imports consist chiefly of coal, jute, sugar, tallow, wood, machinery, and metals, etc.; and the exports of asphalt, refined sugar, honey, sulphur, tartar, and wine-lees.

Repairs.—The local shipbuilding and engineering works, situated on the site of the late Italian Government arsenal, undertake all steam factory work, and can execute the largest repairs to hull and machinery, but there is no dock accommodation, and only one small slip suitable for coasters. There is a crane capable of lifting 20 tons and two steam hammers; about 25 tons of iron can be melted and run at one time, and boilers of 1,000 horse power have been made.

There are three building slips at these works, upon which vessels up to a capacity of 6,000 tons cargo have been built; also a floating dock (for Venice) of 5,500 tons lifting power.

Supplies.—Coal can always be obtained, the stock in hand of private merchants being usually about 6,000 to 8,000 tons. There is no coal wharf, but steamers on application may be allowed to coal alongside the projecting mole, where the depth is being increased to 26 feet. The coal is, however, usually brought alongside in lighters and put on board at a price per ton.

Provisions are in abundance, and good water may be had from a hose on the quay and from tank vessels.

About nine days' notice should be given if several thousand tons are required.

The harbor is about 6 miles northwestward of Mount Conero, and is the only one in this part of the Adriatic sufficiently capacious to receive vessels of large tonnage. It is formed by a mole and breakwater, with an entrance between the two 350 yards wide at the narrowest part.

The North Mole projects 600 yards westward from the northern point of the harbor; this part is 33 yards wide, 68 feet high, with a battery at its end, and is called the Molo Trajano; from thence, it is prolonged nearly 300 yards farther in a 289° direction and near its head is a lighthouse.

A mole, which is known as the Health Mole, projects about 200 yards southwestward of the North Mole, about 200 yards from its inner end; on its northeastern part is the port and health office.

A mole is in course of construction southward from the battery on the North Mole; its present length (1912) is about 100 yards.

The breakwater or South Mole, commencing from the small shallow inner harbor surrounding the sugar refinery, projects in a north-northwestward direction for 640 yards and then curves northward for 210 yards to the extremity of its base, terminating in that direction 920 yards from the customhouse and having a lighthouse near its outer end; the lighthouses on the moles bear from each other 352° and 172° distant 467 yards. This breakwater shelters the harbor from westerly and southwesterly winds.

The work of widening the quays and dredging is in progress, and, when finished, further berths will be available. To facilitate the discharging of coal it is proposed to construct a new breakwater and two jetties, alongside which coal vessels could discharge their cargoes direct into railroad trucks.

Depths.—The depth of water between the moleheads is from $3\frac{1}{4}$ to $4\frac{1}{2}$ fathoms, and in the northern part of the harbor from $4\frac{1}{2}$ to 4 fathoms. In the southern part of the harbor the depth is less than 3 fathoms. The bottom is dark soft mud, except in the southern part of the harbor, where it is rock. There are bollards on the moles for vessels at anchor to haul their sterns in. Dredging is in progress.

Harbor regulations—Caution.—Owing to the works in progress, vessels bound for Ancona should keep in a depth of 8 fathoms. All vessels must wait in a position 4 miles northward of the Cappuccini Semaphore until permission to enter has been signaled from the semaphore.

Anchorage in the roadstead during the day in the vicinity of the port is restricted, except in special cases, to the space eastward of the meridian of the semaphore.

Naval vessels generally moor close southward of the mole, between the port office and the fort at the end of the Molo Trajano, with one anchor to the southward, another to the westward, and the stern secured to the bollards before mentioned. Merchant vessels go alongside the town quays, making fast to bollards placed for the purpose.

There are dolphins or nests of warping posts in the harbor, consisting of piles driven into the ground and firmly secured to each other by braces or crosspieces.

Lights—Mount Cappuccini.—A flashing white light is exhibited from a cylindrical lighthouse with dwelling 65 feet high, on Mount Cappuccini, $\frac{3}{4}$ mile eastward of the mole head of Ancona. The light is at an elevation of 407 feet above the sea and is visible 26 miles.

North Molehead.—A flashing red light is exhibited, at 34 feet above high water, from a white tower, 28 feet high, on the North Molehead, visible 11 miles.

North Mole.—A fixed red light is exhibited at 13 feet above high water from the outer end of the mole in progress from the battery on the North Mole.

A fixed red light is exhibited, at 15 feet above high water, from a mast at each of the two outer corners of the Health Mole.

Breakwater or South Mole.—Near the northern extremity of the breakwater or South Mole is exhibited, from a white hexagonal tower, a flashing green light, elevated 33 feet above the sea and visible 4 miles.

Santa Maria Mole.—Two fixed red lights, horizontal, are exhibited from the end of Santa Maria Mole, visible 2 miles.

Semaphore.—At the lighthouse on Mount Cappuccini is a semaphore and electric telegraph station.

Radio station.—There is a first-class radio station at Ancona. Call letters I. C. A. It is open to the public at all times.

Storm signals are exhibited from Mount Cappuccini semaphore station.

Time signal.—A ball is hoisted halfway up five minutes, and close up three minutes, before the signal, at a mast at Mount Cappuccini semaphore. It is dropped at noon standard mean time, or 23h. 0m. 0s. Greenwich mean time. Should the signal be inaccurate the ball will be hoisted halfway up as soon as possible after the signal and kept in that position for five minutes.

A gun is fired at noon standard mean time simultaneously with the drop of the ball.

Should either of the signals fail, or be inaccurate, they will both be repeated at 1h. 0m. 0s. standard mean time.

Regulations.—On account of the construction work at Ancona Harbor navigation is dangerous. Entering vessels must stop 4 miles northward of the semaphore station and await a signal, keeping in more than 8 fathoms of water.

Mooring buoy.—A mooring buoy is located 459 yards $46^{\circ} 30'$ from the fixed green light on the extremity of the South Mole.

Ancona Road.—The anchorage off Ancona is in depths of from 7 to 11 fathoms, muddy bottom and good holding ground. It is available only in fine weather and is seldom resorted to, except by vessels prevented entering the harbor by contrary winds or as a temporary anchorage. A good berth is in 8 fathoms, mud, the small town of Falconara bearing 258° and the North Mole Lighthouse 165° 1 mile.

This anchorage is exposed during Boras, which are, however, rarely felt at Ancona, and in northwesterly gales, which are much more troublesome, especially in the harbor, where they raise such a sea as to prevent vessels loading or discharging cargo. South-

easterly winds also raise a heavy sea in the road, and heavy squalls off the land are occasionally felt.

Directions.—Mount Conero is a good mark for vessels approaching Ancona either from the north or from the southward. In clear weather Mount St. Vicino, situated 27 miles 230° from the town and one of the highest (4,875 feet) of the Appennine chain, whose conical shape is remarkable, may also be seen from the offing. In foggy or hazy weather, however, when coming from the eastward or from the coast of Dalmatia, care should be taken not to mistake Mount Ardizza, near Pesaro, for Mount Conero. The latter is higher, and may, moreover, be easily distinguished by the objects on it already described. Portions of the land near it are not unlike the high ground in the vicinity of the Needles, Isle of Wight.

On nearing the land the lighthouse on Mount Cappuccini will be recognized, then the town, and lastly the North Molehead. Care must be taken to guard against the current, which sets strongly southeastward in the vicinity of Ancona Point. At night the flashing red light on the North Molehead kept southward of 216° leads 200 yards westward of the Volpe and its surrounding rocks. In rounding the North Molehead at night, a berth of at least 100 yards should be given it, and after entering the harbor a vessel should anchor according to her draft. The fixed green light on the breakwater or South Mole should be given a berth of 150 yards.

Coast.—From Ancona the shore is low and sandy as far as the town of Senigallia, about $13\frac{1}{2}$ miles northwestward of Ancona. It is intersected by several rivers, of which the most important is the Esino, which has its source in the Fabrino Mountains and runs into the sea about $5\frac{1}{2}$ miles from Ancona. Fishing boats may ascend the river at high water. It has been already observed that this shore is bordered by shallow water to the distance of $\frac{1}{2}$ mile, at which distance the depth is from 2 to 3 fathoms. It should therefore be carefully avoided.

The high lands which serve to distinguish this part of the coast are Montagnola, 863 feet high and in the shape of a sugar loaf, about 2 miles southwestward of Ancona, with a tower and a few houses on its summit; Mount Barcaglione, 673 feet high, 1 mile from the shore and 3 miles northwestward of Montagnola, with a convent and some houses on it; and Mount Falconara, which is higher than Montagnola and of similar shape, with numerous buildings and a castle on its summit. It is southeastward of and about 1 mile from the mouth of the Esino River. The railroad from Foligno joins the main coast line at the foot of this mountain, between it and the sea.

Senigallia.—The town of Senigallia (ancient Sena Gallica), is at the margin of the sea on the right bank of the Misa River between

two fertile hills; it is large and remarkable for its ancient ramparts and capacious storehouses, which served as depots for merchandise of every kind in July and August, when the great annual fair used to be held, but which was suppressed in the year 1870.

The town has a population of about 23,000. Provisions and water may be obtained in abundance. Vessels up to 150 tons are built here.

The harbor is at the mouth of the Misa River, the stream from the bridge downward being confined between the two quays bordering its banks for a distance of about 600 yards. At the entrance the stone quays are prolonged by wooden pile piers; the eastern pier is nearly 200 yards in length, is the longer of the two, and has a lighthouse both at its outer and inner ends. The width between the quays and also between the piers is only about 70 feet. The railroad crosses the harbor by a swing bridge half way between the town bridge and the entrance; between the bridges the average depth is only 4 to 6 feet; below the railroad bridge from 6 to 7 feet; and in the entrance about 6 feet. The harbor is capable of holding many coasting craft, which have to be well secured to the quays on account of the rapidity of the stream during freshets.

Works for extending the East Mole of the harbor about 150 feet are in progress.

Lights—East Pier—Inner end.—A fixed white light visible 8 miles is exhibited at an elevation of 47 feet above the sea from an octagonal brick tower and dwelling, 39 feet high, at the extremity of the stone mole, and at the inner end of the wooden pier on the eastern side of entrance to Port Senigallia.

East Pierhead.—From a wood structure, painted in white and dark-red horizontal stripes, 13 feet in height, on the East Pierhead is exhibited a small fixed red light, elevated 22 feet above the sea, and visible 3 miles, which is changed to green when Misa River is so swollen as to prevent entry.

The two lights in range show the direction of the line of approach.

Light.—A fixed red electric light is exhibited from posts on the outer extremity of the East Mole to mark the works in progress.

Directions.—In clear weather, the peaks of Catria or Caia Mountain, 5,581 feet high, may be seen from a great distance and are useful in making the land when bound to Senigallia; this mountain bears about west-southwestward 27 miles of the town, and has a forked summit. On a nearer approach the village and steeple of Scapezzano, on a hill 613 feet high, and 2 miles 272t from Senigallia, will be seen; also the village and tower of Albani on another hill 2 miles to the southward; and lastly the town of Senigallia and the lighthouses on the East Pier, which should be brought to bear about 182° when 1½ miles distant and the soundings about 4 or 5 fathoms.

There is a depth of from 6 to 7 feet at high water in the passage between the piers, but the banks at the mouth of the river occasionally change their position. In fine weather coasters anchor off the harbor about 600 yards northeastward of the pierheads.

Fano.—The coast from Senigallia to Fano, $11\frac{1}{2}$ miles farther northwestward, is bordered by a bank, the 5-fathom curve being about 1 mile from the shore. Within this space the Cesano River, which rises at the foot of Mount Catria, and the Metauro, which descends from the Apennines, reach the sea, and their volume and strength are often so great that the mud brought down by them discolors the water to a great distance; neither of these rivers is navigable.

The town of Fano is surrounded by well cultivated hills. Its numerous edifices and steeples give it the appearance of a large town; it has a population of about 20,000, contains large silk manufactories, but affords few supplies for shipping.

The port of Fano is at the mouth of the northern arm of the Metauro, which, straightened and embanked, is named the Chiuse Canal, and joins the Metauro proper about 4 miles inland; along the banks of the harbor are quays but little frequented, the harbor being so encumbered by sand as to render it often impracticable for even the smallest vessels. The bed of the port is a mixture of gravel, mud, and large stones. The entrance lies between two moles, and from the shore eastward of the eastern mole is a protective mole or breakwater extending nearly 200 yards in a northeasterly direction. The coast-line railroad crosses the harbor only 500 yards within the mole. Large vessels anchor in fine weather $1\frac{1}{2}$ miles from the shore. Viewed from about 8 miles eastward the bridge over the southern arm of the Metauro may be seen to the left of the town of Fano.

Works for extending the mole eastward of the eastern mole of the harbor and the western mole have been completed.

Lights.—A fixed white light is exhibited at 58 feet above high water, from a red circular tower and dwelling, 51 feet high, situated on the eastern side of Fano Port just within the entrance moles and should be seen from a distance of 10 miles.

A fixed red light is exhibited, at 27 feet above high water, from a masonry turret, 19 feet high, on the mole eastward of the eastern mole of the harbor, visible 4 miles. The works in progress for extending this mole are marked by a red light.

A fixed red lantern light is exhibited from a pole on the outer end of the mole on the eastern side of the entrance in fine weather.

A fixed green light is exhibited from the western molehead. The works in progress for extending this mole are marked by a green light.

Coast—Landmark.—Mount Catria, the high forked mountain before alluded to, is a good mark in making this part of the coast; on nearing the land, vessels will be guided by Mount Giove, 840 feet high and about 3 miles southwestward from Fano, on the summit of which is a large monastery with a high steeple; also, by Mount Novillara, 780 feet high, with a small village and a round tower on its wooded summit, which latter lies west-northwestward, 4 miles from Fano; and, lastly, by the town of Fano.

From Fano the coast suddenly rises, the hills from Mounts Novillara and Ardizza, situated $1\frac{1}{2}$ miles southeastward of Pesaro, extending to the margin of the sea, and here the coast line railroad leaves the shore and, skirting the southern side of Pesaro, passes through the valley in the rear of these hills. When seen in range from a distance, Mounts Novillara and Ardizza resemble Conero; they are lower than the latter, but, like it, their greatest height is on the southeast; they become depressed toward the northwest, where Mount Ardizza terminates in a perpendicular cliff on which stands a house with a semaphore. The coast from Fano to Pesaro, about $6\frac{1}{2}$ miles distant, is bordered by a bank which extends $\frac{1}{2}$ mile from the shore, at which distance there is a depth of 2 fathoms.

Pesaro.—The town of Pesaro stands near the seashore in the valley formed by Mount Ardizza and by a chain of hills stretching northwestward, of which Mounts Fiorenzuola and Mezzo, distant 4 and 5 miles, respectively, from the town, are the highest, the latter being 755 feet above the sea. This place contains silk, porcelain, crystal, and other manufactories; its population is about 25,000.

The port.—The river entrance to the port is the mouth of the Foglia River, which takes its rise at the foot of Mount Sasso Simone. The entrance channel trends in a south-southeastward direction between a mole and the land westward of it $\frac{3}{4}$ mile, thence it curves to the southward, which is its direction at the bridge, at which point the fortifications of the town abut on the river. The depth at the entrance was formerly about 6 feet, sandy bottom, gradually decreasing through the greater part of the channel to near the bridge, where there was less than 2 feet water. By the chart this entrance appears to have silted up; sand banks form and disperse at and off the entrance according to the direction of gales of wind. The port shelters a large number of small coasting vessels.

At 400 yards eastward of the river entrance is another opening between two piers or jetties, also shallow, about $4\frac{1}{2}$ feet of water being the depth just at the entrance; and 6 feet within; near the head of the eastern mole of this entrance is the lighthouse. This basin does not communicate with the main river, but forms an artificial harbor.

Mounts Ardizza and Fiorenzuola, each crowned by a village, serve as marks for Pesaro. On approaching the coast, the town and light-house will be seen.

Vessels of deep draft may anchor in fine weather at $1\frac{1}{2}$ miles from the land, in a depth of $5\frac{1}{2}$ or $6\frac{1}{2}$ fathoms, mud.

Pesaro—Shoals.—Foul ground, terminating in a rock with less than 6 feet water, extends nearly 150 yards northward from the outer end of the eastern pier, and a rock, with 1 fathom water, lies 300 yards northwestward of the same place.

Lights—Eastern entrance.—On the East Mole, 47 yards within the extremity, a group flashing white light is exhibited from an octagonal red tower at an elevation of 48 feet above the sea, visible 10 miles.

From a post situated 10 yards within the extremity of the same mole, a fixed red light, elevated 20 feet above the sea, is exhibited, which is visible 3 miles.

On the West Mole, 13 yards within its extremity, from a gray shed with an iron mast, a fixed green light is exhibited, elevated 20 feet above the sea, and visible 5 miles.

A small fixed red light marks the outer extremity of works in progress at the harbor entrance.

The coast from Pesaro to Rimini, a distance of 17 miles, is intersected by many streams and rivers, of which the Conca is the only one of any importance, fishing boats being able to ascend it at high water. Westward of the high land of Fiorenzuola and Mezzo the coast forms a slight bay; near its shore is the village of Cattolica. Small vessels anchor off the shore between the mouth of the Conca and Gabice Village and are sheltered from westerly and southerly winds by the land of Mount Mezzo, but are quite exposed to those from southeast round by east to northwest; southwesterly winds give rise to violent squalls.

Light—Castel di Mezzo.—Near a point about 5 miles northwestward of Pesaro stands a cylindrical lighthouse with one-story dwelling attached, 62 feet in height, from which, at an elevation of 230 feet above the sea, is exhibited a group flashing white light, visible 22 miles. (See Light List.)

Daymark.—The name "Castel di Mezzo" has been painted in large black letters on Castel di Mezzo Lighthouse.

Cattolica is situated 2 miles westward of Castel di Mezzo, on the main coast railroad line, which here again approaches the shore. In approaching the anchorage off Cattolica from the northeastward a vessel has on her port bow the high hills of Gradara and Luro, on the summits of which are some steeples visible at a considerable distance; also Mounts Fiorenzuola and Mezzo, whose bases are washed by the sea. On nearing the coast Cattolica and the tower at the mouth of the Conca will be seen.

Lights.—At the end of the East Pile Jetty at Port Cattolica is a gray octagonal wooden turret, from which is exhibited, at an elevation of 29 feet above the sea, a fixed light, visible 5 miles, showing red seaward and white inshore.

A fixed light showing green to seaward and white inshore is erected on the west pile jetty.

Canale di Riccione—Light.—At about $4\frac{1}{2}$ miles northwestward of Cattolica, on southern side of entrance of the Canale di Riccione, a fixed light is exhibited, visible 3 miles and showing white to seaward, red to northward, and green to the southward.

Rimini.—The town of Rimini (ancient Arminium), stands at the foot of fertile hills on the right bank of the Marecchia, a river which rises in the Apennines; its harbor, at the mouth of that river and formed in its channel, was formerly of great celebrity. A fine marble bridge of five arches, each arch having a span of 27 feet, crosses the river at the head of the harbor, and a triumphal arch erected to Augustus still exists. It is a walled town, with a population of about 38,000; it stands on the main coast line railway, which crosses the river between the town and the sea, from thence turning inshore, and finally quitting the coast of the Adriatic. Rimini has silk and sulphur factories and building yards for small vessels. Provisions, water, and ship's stores in small quantities can be procured; it also carries on a trade in salt fish.

The harbor is navigable for small craft for about 1 mile from its entrance. Two moles extending 300 yards from the shore in a north-northeastward direction form the entrance channel, which is bordered by quays up to the walls of the town. The depth is about 6 feet in the entrance, and, in places, only about half that depth can be carried up to the town. The harbor will contain numerous small vessels moored to the quays; but, after excessive rains, it is frequently encumbered by gravel and flints brought down by freshets, and at such times the stream is sometimes sufficiently rapid to cause vessels moored to the quays to break adrift. It is likewise difficult for sailing craft to approach, owing both to the strong current across the entrance and to the banks off it, which frequently vary in position.

Lights.—An occulting white light is exhibited, at 67 feet above high water, from a yellow, square, brick tower and dwelling, 59 feet high, near the inner end of the East Mole, visible 14 miles.

The turret on the outer end of the East Mole has been painted in red and white horizontal bands.

Beacon.—A beacon, painted in red and white stripes, is established on the pilework of the eastern mole, immediately in front of the light turret.

A fixed red light is exhibited, at 25 feet above high water, from a white turret with a copper cupola, 17 feet high, situated on and near the outer end of the East Mole, visible 5 miles. When freshets occur in Marecchia River this light is extinguished, it being then dangerous to enter. The fixed red light bears $7^{\circ} 30'$ from the occulting white light.

An occulting green light is exhibited, at 25 feet above high water, from a black iron mast over a hut, painted white and black in horizontal bands, on the outer end of the West Mole, visible 4 miles.

Fog signal.—A bell, placed 24 feet above high water, in a gray metal cylindrical turret, with a masonry base, 17 feet high, 40 yards from the outer end of the East Mole, is struck once every 15 seconds; the signal is also given in freshets. (See Light List.)

Directions.—When standing in for the land in the vicinity of Rimini in clear weather, vessels will sight the Carpegna Mountains, 4,616 feet high, with flat summits and wooded sides, lying southwestward 20 miles from the entrance to the port; and southward of them Mount Sasso Simone, which is lower and has the appearance of being crowned by a wall. Mount San Marino, 2,454 feet high, next appears in view and is easily distinguished by its height and by the houses and four towers on its summit. The town of Rimini is afterward seen, and then the lighthouse, which should be steered for.

The coast from Rimini to Cesenatico, about 11 miles farther northwestward, is sandy, very low, and difficult of access even for fishing boats, owing to the banks formed by the numerous streams which run into the sea within this space. Of these, the Uso River, the entrance to which is 6 miles northwestward of Rimini Lighthouse, may be ascended by fishing boats at high water when the sea is smooth. The village and tower of Pedrera, as well as Bellaria and its tower, which latter stands at the mouth of the Uso, are the only remarkable objects on this part of the coast.

Bellaria.—A harbor of refuge for fishing boats is being constructed at Bellaria, at the mouth of the Uso River, the eastern mole is completed, and is about 150 yards in length, a portion of the protecting wall facing the sea.

Cesenatico.—This small harbor is an artificial channel formed by two piers projecting seaward at right angles to the shore and is difficult of access, owing to banks at the entrance. The southeast pier is about 200 yards in length. The northwest pier has been extended. It will contain many small coasting craft and is the chief harbor on this part of the coast. It is, however, silting up, and at low water the depth is not more than about $3\frac{1}{2}$ feet, with a muddy bottom. Cesenatico is the port of the town of Cesena, which town stands on a hill 545 feet high, at the foot of the Apennines, and is about 8 miles westward of the port. Its population is about 3,500.

The Carpegna Mountains, before described, south-southwestward of Cesenatico village, are good landmarks for pointing out its position, as is also Mount San Marino.

Lights.—A fixed red light is exhibited at 27 feet above high water from the southeast pierhead.

A fixed white light is exhibited, at 61 feet above high water, from a square tower, 58 feet high, situated about 300 yards within the outer end of the southeast pier, visible 8 miles.

A fixed green light is exhibited from a square gray house on the northwest pierhead.

Fog signal.—During thick or foggy weather a bell at the southeast pierhead is struck once every 15 seconds.

Cervia.—The entrance to this little port is between two moles 4 miles northward of Cesenatico; it is formed by an artificial channel, which collects the waters from the surrounding mountains, retaining those of the sea by means of a sluice. Surrounded by salt marshes, it is almost silted up, there being scarcely $1\frac{1}{2}$ feet in it at low water. The town of Cervia stands on the right bank of the channel and contains a population of about 7,000, who are chiefly occupied in preparing salt from the marshes; about 50,000 tons are annually produced. The salt is kept in large storehouses and constitutes almost the entire trade of the town.

As before stated, Mounts Carpegna and San Marino serve as excellent marks in making the land in this vicinity. On approaching the harbor, either the lights by night or the position of the village of Cervia by day, at the southeastern extremity of a large pine forest, sufficiently indicate the course for boats steering for the entrance channel.

Lights.—A fixed white light is exhibited, at 53 feet above high water from a red octagonal tower, 41 feet high, situated near the inner end of the South Mole; visible 8 miles.

A fixed red light is exhibited, at 14 feet above high water, from an iron lamp-post, 7 feet high, on the South Molehead, and should be seen from a distance of 2 miles; it is unwatched.

Ronco River—Semaphore.—There is a semaphore station about $1\frac{1}{2}$ miles southward of the entrance to Ronco River.

Coast.—The vast pine forest which commences 2 miles southward of Cervia covers the coast for about 18 miles, extending nearly as far as Primaro and for about 2 miles inland. The whole of this extent of coast is sandy, low, and everywhere intersected by marshes and streams which render it uninhabitable. The high lands bordering the coast nearer Ancona disappear almost entirely northward of Cervia, nor are the Apennines any longer seen at a short distance inland.

Between Cervia and Ravenna, distant $10\frac{1}{2}$ miles, access to the coast is obstructed by banks of mud and sand brought down by the Savio River, which reaches the sea 3 miles from Cervia, and by the Ronco or Montone, the mouth of which, accessible to small fishing boats, is about $\frac{1}{2}$ mile southward of the parallel of Ravenna. About 1 mile from the shore there is a depth of $2\frac{1}{2}$ fathoms.

Bevano Bay—Anchorage.—The coast between the Savio and the Montone forms the slight bay of Bevano; at its head is a small stream of that name and a marsh which is gradually filling up. Coasting vessels anchor in this bay northward of Savio Point, which slightly protects them against southerly winds. Bevano Tower on the south, in the middle of the marsh, and Torrazza Tower on the north, point out the position of the bay.

Ravenna.—This town, which originally stood on the seashore, is now between 4 and 5 miles from the coast, and on the border of the forest before mentioned. It is a large town, containing a population of about 70,665, with a silk manufactory, and rather an important trade. The country around is marshy; fresh water is very scarce.

The harbor no longer exists, and its remains, 2 miles northwestward of the mouth of the Ronco or Montone, are scarcely to be traced. On approaching the land near Ravenna from the eastward, the water shoals regularly; the coast line being very low, the domes and towers of the churches of Ravenna are distinctly seen amidst the surrounding trees at the distance of 8 miles from the shore.

Corsini, $5\frac{1}{2}$ miles northward of the mouth of the Ronco, now serves as the Port of Ravenna, the communication between the two being by canal. Ravenna itself is the terminus of a railroad which communicates through Imola with Bologna, and thus with the general Italian system.

Port Corsini is the mouth of the canal which commences at Ravenna, and during its course of 6 miles is fed by the water from the neighboring marshes. Vessels of some 80 tons ascend it, with the flood, to the town. The depth of water at the entrance is maintained by two moles, 120 feet apart, which project eastward about 870 yards, the southern mole extending rather beyond the other; both moles are being extended eastward. The depth in the channel to Corsini is 13 feet, and 9 feet can be carried to Ravenna. The entrance is liable to obstruction during extension of moles. The pilot station is at the lighthouse on the southern side of the canal, 400 yards inland.

Lights.—A fixed and flashing white light is exhibited, at 87 feet above high water, from a white octagonal tower over a three-storied dwelling, 80 feet high, situated about 400 yards inland on the southern side of the canal; the flash should be seen from a distance of 15 miles, and the fixed light of 7 miles.

South Mole.—A fixed red light is exhibited, at 23 feet above high water, from a gray iron house on and near the end of the southern mole, visible 6 miles. Extension works in progress are marked by a provisional red light.

North Mole.—A fixed green light is exhibited, at 23 feet above high water, from a gray iron house on and near the end of the northern mole, and should be seen from a distance of 5 miles; it is unwatched. (For the arc of visibility, see Light List.) Extension works in progress are marked by a provisional green fixed light.

Buoys.—A red conical buoy is moored about 200 yards eastward of the southern mole extension works, and a similar buoy close south-eastward of the same mole end.

Mark.—From the middle of the head of the North Mole a mast projects horizontally 13 feet, and at its ends is a red cone.

Fog signal.—In thick or foggy weather a bell at the end of the South Mole is struck by machinery once every 20 seconds.

Tidal-stream lights are exhibited from the top of the main lighthouse to show the direction of the stream: (a) Two red lights, placed vertically, denote that the stream is running in. (b) Two red lights, placed horizontally, denote that the stream is running out.

Directions.—The main light bears from the South Mole Light about 259° , and the two lights in range lead up to the entrance.

In standing in to make the land at Corsini, or anywhere on this part of the coast, which is flat and only visible at a short distance, Bertinoro is the first town sighted, and that before the pine forest on the coast is seen. It stands on Mount Capuchin, a hill 1,115 feet high, 12 miles westward from Cesenatico and about 16 miles south-south-westward of Ravenna, which latter subsequently appears behind the trees, and, lastly, on the beach are seen the houses of Corsini, and the main lighthouse, which stands quite alone.

The only remarkable object between Corsini and Primaro, 6 miles northward of it, is an isolated tower 3 miles from the entrance to Corsini pointing out the mouth of the Lamone River, which river is generally choked by sands at its entrance.

Lamone River.—Two reinforced-concrete moles have been built out, about 60 feet apart, for a distance of 150 yards from the shore, at the mouth of the Lamone River.

Depths.—The depths vary constantly between the moles, the greatest being about 8 feet, but there is frequently only $1\frac{1}{2}$ feet in the channel.

Coast—Po di Primaro.—Vessels of 70 or 80 tons ascend this river as far as the Faenza Channel, distant 9 miles from the coast, and those of 18 or 20 tons ascend to Tragetto, 20 miles farther; though not considered one of the mouths of the Po, it is in fact connected

with that river and is a continuation of the Reno. On the southern side, near the mouth of the river, is an electric telegraph station.

The entrance is obstructed by banks extending some distance offshore, through which the depth is only about 6 feet at low water; these banks occasionally change their position. The entrance should only be attempted with the flood tide.

Some buildings close to Primaro, the round tower 2 miles to the south, and two tall trees on the northern side of the entrance point out its position. The village of St. Alberto, on the right bank of the river and 8 miles from the sea, is the center of the trade of Ferrara with the coast; it possesses good storehouses and provisions are abundant.

The coast northward of Primaro is a mere strip of low land, occasionally cultivated but generally consisting of a series of small sand-hills, which separate the sea from the great Comacchio Lagoon. The lagoon, fed by the waters of the sea which enter at Port Magnavacca, leading to the Pallotta Canal, embraces an area of 150 square miles and has a depth of about 3 feet in every part over a clay bottom.

Comacchio.—The small fortified town of Comacchio, in the midst of unhealthful salt marshes, is on the Pallotta Canal, about $2\frac{1}{2}$ miles from the coast and surrounded by canals on every side. Its inhabitants, about 10,000, carry on a considerable trade in salt fish, and particularly in eels, with which the lagoon abounds. Provisions are plentiful, but water is scarce. Fishing boats are constructed here.

Magnavacca.—The lagoon is entered at Port Magnavacca, and from thence vessels proceed by the Pallotta Canal to Comacchio. The waters of this canal are influenced by the tide, and during the months of February, March, and April their depth increases by about 2 feet. Vessels of not more than 50 tons enter Port Magnavacca, and smaller ones ascend with the tide as far as Comacchio.

A red tower nearly 1.3 miles westward of the entrance to Port Magnavacca, the church steeple of Comacchio about 3 miles north-westward, and the semaphore of Primaro indicate the position of the entrance to the port.

A bar has formed at the entrance to Port Magnavacca, rendering access difficult.

The moles at Magnavacca are to be prolonged, and work on them has commenced; vessels should therefore approach the entrance of the port with caution.

Lights.—Near the mole at the northern side of the entrance to Magnavacca, at 214 yards from the extremity of the piles, a fixed white light is exhibited from an iron mast over a shed, at an elevation of 35 feet above the sea, visible 10 miles.

A fixed red light is exhibited, at 32 feet above high water, from a mast surmounting a grey hut, situated 27 yards from the southern extremity of the piles, visible 6 miles. The lights are unwatched.

Anchorage.—Vessels anchor in a depth of 5 fathoms about $2\frac{1}{2}$ miles from the coast, half way between Magnavacca and Volano, which latter is 8 miles farther northward. The anchorage is good with offshore winds, but exposed to those from between northeast and south. In approaching this low shore the lead should be kept going.

The Delta of the Po, or so much of it as protrudes beyond the general trend of the coast line, may be considered to begin 2 miles northward of Volano and extend northward to Port Caleri, a direct distance of about 16 miles, but 30 miles as measured by the coast. The soil brought down by the river and deposited in the sea; has, in the coarse of ages, greatly changed the outline of the coast, and the eastern extremity near Maestra Point, is about 8 miles in advance of the natural line of shore; this change and extension is still in progress and, in 1886, the Italian survey of this coast showed that a depth of 16 feet was all that existed at $2\frac{1}{2}$ miles southeastward of Maestra Point; at the present time (1913) the depth, less than 18 feet, is reported to lie 3 miles east-southeastward of the lighthouse. So rapid and uncertain is this extension that no vessel navigating these waters should approach the coast between the mouths of the Po delle Tolle and the Po di Maestra nearer than 4 miles nor within a less depth than 16 or 17 fathoms. The general character of the land is that of a low flat marsh.

The Po River.—The various mouths of the Po, which may be considered to be eight in number, embraces an extent of about 26 miles of coast, including the Po di Volano on the south and the Po di Levante on the north.

The river has its source in the Grisons Alps at Monte Viso, and after flowing 280 miles eastward from Turin reaches the Gulf of Venice, receiving in its course the waters of several tributary streams. Lombardy, which it intersects, is composed entirely of an alluvial, black fertile soil of great depth, and is one of the richest plains in the world.

From Piacenza to Papozze and Serravalle villages, 19 miles below Ponte-lagoscurio, the Port of Ferrara, the river flows between embankments; it bears the name of Po Grande until it reaches these villages, when besides the smaller branches presently named, it divides into the Po di Maestra and the Po di Goro, now the chief navigable branches.

The Po di Volano is the southernmost branch of the river; next comes the Po di Goro and Po della Gnocca flowing into the sea through projecting low land which separates Goro Road from Pelazza Bay. Between Pelazza Bay and Maestra Point, there are three mouths which lead to the Po delle Tolle, a continuation and the

outlet of the Po Grande or Po di Maestra. These mouths are the Busa del Bastimento, the Po del Canerino, and the Busa della Pila; they contain numerous sandbanks and as there are scarcely any recognizable objects, the navigation of them is difficult for those with local knowledge. Northward of Maestra Point are several small entrances and the principal mouth of the Po di Maestra; and, lastly, the Po di Levante the northernmost of all.

Depths.—The four practicable passages have but sufficient depth for small craft. The Po della Pila, the easternmost mouth by the chart, has about 4 feet water over the bar at the entrance, but there are depths of 2 to 4 fathoms in the Po della Torre with which it communicates. The other entrances are apparently still shallower, though the Goro is said to have 6 feet in the entrance; the chart shows a dry flat in front of it. They are only available with the assistance of a pilot. See details following.

Port Volano is the outlet of the Po di Volano, the southernmost branch of the Po River, which runs into the sea on the western shore of Goro Road. This branch of the river, after receiving the waters of the Poatello and of the various canals which unite under the walls of Ferrara, is called the Po di Volano. Small coasting craft ascend it to the village of Codigoro, where a few supplies may be obtained; and from thence they go up to Ferrara.

A tower and a few houses indicate the entrance of Port Volano; also, a large forest of pine and oak trees, which, beginning at the tower, extends $4\frac{1}{2}$ miles northward. The entrance is round a tongue of sand which runs parallel with the coast and extends nearly $1\frac{1}{2}$ miles northward of the tower.

At $2\frac{1}{4}$ miles southward of Volano Tower is a small entrance into the lagoons known as Port Bianco.

Goro Road, or Sacca dell' Abate, is the bay 3 miles deep and of semicircular shape, commencing at Port Volano and terminating in the low land at the mouth of the Po di Goro. The whole of the bay is encumbered by soil deposited by the several mouths of the Po. The anchorage in Goro Road, off the central part of the bay, affords good shelter against winds from east-northeast, round by north, to southwest; the bottom is a mixture of mud and clay, and it is often difficult to weigh the anchor when the precaution of occasionally sighting it has not been taken.

In seeking shelter here, it must be borne in mind that shallow anchorage ground extends a long way outside the limits of the bay. With Goro lighthouse bearing 41° distant $3\frac{1}{2}$ miles, the depth is only about $5\frac{1}{2}$ fathoms; farther in toward the bay, with the lighthouse 63° , 3 miles, the depth is $3\frac{1}{2}$ fathoms; and, in line between the lighthouse and Volano Tower, the depth is only 9 feet.

The Po di Goro is that branch of the river which leaves the main stream about 1 mile westward of the village of Sta. Maria in Punta, and flows into the sea at the southeastern extremity of Goro Road, after a course of about 26 miles. Between its mouth and its point of junction with the main stream or Po Grande, are the villages of Gorino, Goro, Mesola, and Ariano. Above the junction, small craft ascend as far as Ponte-lagoscuro, from whence the channel is taken for Ferrara.

Depths.—At the entrance to the Po di Goro there is a depth of about 6 feet, but the sand and mud brought down by the river cause the depths to be very changeable. The channel is generally marked by poles for those locally acquainted.

Near Goro Point is the lighthouse presently described, and a large building with red roof situated 1,100 yards eastward of it. About $2\frac{3}{4}$ miles north-northwestward of the lighthouse is the church steeple of Gorino; and, nearly 9 miles west-northwestward of the lighthouse, the tall steeple of Pomposa, terminating in a sharp point, with Volano Tower to the left of it. These objects serve to identify the land.

Goro Point—Light.—An alternating fixed and flashing light, fixed white, flashing red, is exhibited, at 66 feet above high water, from a white conical tower rising from a two-storied house, 59 feet high, situated on Goro Point, which is on the southwestern side of the Po di Goro; the light is visible 14 miles. (For the arc of visibility, see Light List and chart.)

The Po Della Gnocca is a branch of the Po which enters the sea about $1\frac{1}{2}$ miles northeastward of Goro Point. Its mouth is generally preferred by boats proceeding to Venice by the inland channels, in order to avoid rounding Maestra Point and the navigation of a difficult, and, in the winter season, dangerous coast. The shoals off the mouth frequently shift their position; piles are placed to indicate the channel, which has about 5 feet water, but deepens considerably within.

Pellazza Bay is a large shallow indentation northeastward both of the Po di Goro and della Gnocca and open to the southeastward. From a depth of 2 fathoms at $1\frac{1}{2}$ miles southward of Goro Lighthouse, the same soundings trend in an east-northeastward direction across the mouth of the bay and $1\frac{3}{4}$ miles southeastward of the mouth of the Po delle Tolle.

Anchorage.—There is good anchorage in northerly and westerly winds in a depth of about 5 fathoms, with Goro Lighthouse in range with a large red-roofed building, bearing 277° , and Gorino Church steeple 305° . As the water shoals suddenly and the shoals are rapidly extending near the mouths of the Po delle Tolle, and from

thence northward, care should be taken not to stand too far in. In case of necessity, vessels may anchor off any part of this coast; the holding ground is good.

Po della Pila.—**Maestra Point** is at the eastern extreme of the delta of the Po; it is very low, the land in its vicinity being marshy, and divided by streams into a vast number of islands which frequently change their form, especially after heavy winter rains, and, in the spring, at the melting of the snows. There are, however, trees, near it, close to the coast, which may be seen at a distance of 5 miles, and the white lighthouse somewhat farther. As previously stated, it is advisable to avoid closing the land in this neighborhood within 4 miles, as depths of less than 3 fathoms extend $2\frac{1}{2}$ miles offshore, which depth is constantly growing out to the eastward along the front of the delta; the shallow bottom may be readily distinguished by day, in fine weather, by the discoloration of the water. A haze generally hangs over the coast, and it should be approached with great caution. **Maestra Point** is $11\frac{1}{2}$ miles northward of the parallel of **Goro Lighthouse**, it projects but little beyond the general line of the beach, and the lighthouse stands on the low shore northward of the entrance of the **Po della Pila**. The **Po della Pila** has a charted depth of 4 feet in the entrance; it is subject to change.

Shoal—Caution.—The shoal on the southern side of the **Po della Pila** has extended, and there are (1913) depths of less than 3 fathoms to about $4\frac{1}{2}$ miles east-southeastward of **Maestra Point Lighthouse**. The light and whistle buoy should be given a good berth, as there are depths of less than 3 fathoms southward and southeastward of its position.

Light—Maestra Point.—A revolving white light is exhibited, at 148 feet above high water, from a white cylindrical tower over a white two-storied dwelling, 138 feet high, on **Maestra Point**, northern side of **Po della Pila** entrance, visible nearly 3 miles inside the outer edge of the bar. Visible 18 miles. The eclipses are not total within 10 miles.

A ray of light is thrown vertically from the lantern. (See **Light List**.)

Fog signal.—During thick or foggy weather a steam siren is sounded about $1\frac{1}{2}$ hours after the commencement of a fog and will be heard only a short distance except under favorable conditions. (See **Light List**.)

Lightbuoy.—A conical light and whistle buoy, painted black and white in horizontal stripes, and exhibiting an occulting white light, is moored about 4 miles east-southeastward of **Maestra Point Lighthouse**.

The Po di Maestra is the northwestern branch of the Po; its mouth is about 5 miles northeastward of **Maestra Point**, between

which are two other small openings, Porto Parti Acque, $1\frac{1}{2}$ miles northward of the point, and Port Palo, within 1 mile of the Po di Maestra. Access to the Po di Maestra is extremely difficult, as the sand banks frequently shift and the current is very rapid.

The channel is, in places, marked by piles and the depth at the entrance is about 3 feet.

Contarina church steeple is a good distinguishing mark for this part of the coast; it is white and bears 258° distant $7\frac{1}{2}$ miles from the mouth of the Po di Maestra.

Port Levante, $1\frac{1}{2}$ miles westward of the Po di Maestra, with a deep bight of very shallow water extending southward between them, is the mouth of the Po di Levante, which joins the Bianco Canal; the latter leads to Adria and Astiglia, and communicates by channels with the Adige and Po Grande.

It has sufficient depth for very light craft only and the sand banks at its entrance, where there is but $3\frac{1}{2}$ feet of water, are subject to change. The village of Levante is on the southern side of the entrance to the river.

Port Caleri, $2\frac{1}{2}$ miles northwestward of Levante, is another small passage leading to the interior.

Range lights.—Rear: An occulting white light is exhibited, at 26 feet above high water, from a white metal trellis tower near the coast about 1 mile northward of the Po di Levante, visible 9 miles.

Front: An occulting white light is exhibited from a movable metal mounting situated 220 to 330 yards from the rear light, visible 7 miles. This light is moved as changes in the channel require.

Small vessels approach the entrance to the channel leading to Port Levante with the lights in range, which leads clear of the shifting bank to the eastward of the entrance.

The range lights are moved as necessary.

Approaches to Venice—Lagoons—General remarks.—The coast between Maestra Point and San Nicolo de Lido, a distance of about 30 miles following the coast line, is extremely low and intersected by marshes, which render the neighborhood very unhealthy in summer. The largest of these marshes form the lagoons of Venice and Grado. As far as Sottomarina Battery, about 1 mile southward of the entrance of Port Chioggia, the low sandy coast is bordered for a long distance off-shore by shallow water, with soundings gradually deepening toward the offing, and when northward of the Po di Maestra it may be approached with prudence by the lead; southward of that river it should not be approached within 4 miles. When northward of the delta of the Po, and as far as San Nicolo del Lido, a depth of $5\frac{1}{2}$ fathoms will be found at an average distance of $1\frac{1}{2}$ miles from the shore.

The whole of this low coast is almost destitute of sea marks except the steeples of some of the more important villages, such as Contarina, westward of the entrance of the Po di Maestra, Madonna di Marina Chapel, northward of Port Brondolo, and northward of this Sottomarina Village and the town of Chioggia, etc.

In the lagoon are numerous islets of varied and pleasant aspect, rising but little above the level of the water. These islets are about 100 in number; 25 of them are inhabited, and the city of Venice is built upon the largest of them, though this island itself is said to consist of no less than 72 islets or shoals connected with each other by the bridges of the city. The lakes or lagoons form a basin about 25 miles in length from north to south, which is separated from the sea by a long strip of land forming the Lido, a natural sea wall consolidated by artificial means and serving as a protection to the inner anchorages.

Navigation in the channels—Regulations.—Seagoing steamers are to proceed at a moderate speed, not at any time exceeding 6 knots, and when near other vessels moored in the channel the speed is to be reduced to the slowest possible to keep the vessel under control.

Steamers entering or leaving should proceed at intervals of not less than 10 minutes apart.

Steamers of more than 1,500 tons net, when leaving Marittima in ballast, with a favorable stream or strong wind, should have a tug ahead to assist the steering until beyond the military mooring buoys at Giardini. A tug will be compulsory for those steamers which have inflammables or explosives on board, when required by the Captain of the Port.

Steamers are not allowed to pass one another in the channel.

Sailing vessels over 80 tons net are not allowed to navigate under sail in the channels, and those of less than 80 tons must leave the fairway clear for steamers and their tugs, anchoring or mooring on the side of the channel if necessary. Any warping lines used must not obstruct navigation. The mooring posts in the channels and along the banks are fixed and assigned by the port harbor master. Mooring cables which present any danger to vessels should be marked during the day by a noticeable mark and at night by a white light.

A copy of these regulations and also those affecting local steam and motor craft will be shown to the masters of vessels by the pilots.

The regulations must be strictly carried out.

Pilotage—Caution (1915).—All vessels must keep 6 miles off-shore between Port Cortellazzo, in (approximately) latitude $45^{\circ} 32' 30''$ N., longitude $12^{\circ} 45' 48''$ E., and Port Levante, in (approximately) latitude $45^{\circ} 03' 50''$ N., longitude $12^{\circ} 21' 40''$ E.

Vessels arriving after sunset must stop 12 miles eastward of the Pilot Tower and Semaphore Station, in (approximately) latitude $45^{\circ} 21' 00''$ N., longitude $12^{\circ} 19' 40''$ E., and await the pilot vessel.

Vessels may enter the harbors of Lido, Malamocco, and Chioggia between sunrise and sunset in clear weather upon permission from the proper authorities.

Ports.—There are six channels, called ports, leading to Venice, viz, Ports Brondolo, Chioggia, Malamocco, San Nicolo del Lido, St. Erasmo, and Tre Porti. The entrance to the two last is between the piers forming the new port of San Nicolo del Lido. All these lagoon ports are either the mouths of existing rivers or of former river beds.

The navigation of the lagoons and of the various channels between them is in a great measure carried on by towing and tracking. Pilots are generally employed, and the winding passages are marked by piles. The flood stream enters with rapidity and speedily spreads over the scattered ponds and muddy morasses, so that at high water the scene is strangely changed, presenting one vast sheet of water which reaches from the islands on the coast to the mainland.

Port Fossone is at the mouth of the Adige River, one of the chief rivers of Italy, which rises in the Swiss Alps, traverses the Tyrol, passes by Trent and Verona, and reaches the sea about $4\frac{1}{2}$ miles southward of Chioggia. It communicates with the lagoon ports and is navigable by boats as far as Verona, those of very light draft even ascending a short distance above Trent.

Port Fossone is fronted by sand banks, and a channel through them into the river carries about 3 feet water. The depth about $1\frac{1}{2}$ miles off the river entrance is from 5 to 6 fathoms. Within 5 fathoms the water shoals rapidly.

Port Brondolo, about $1\frac{1}{2}$ miles northward of Port Fossone, is at the mouth of the Brenta River, which rises in the mountains between Trent and Belluno and flows through a flat country from Bassano to the sea. It enters a navigable canal leading from Padua to Venice and at Dolo trends southward and runs into the sea at Brondolo. The Brenta communicates by canals with Chioggia, Padua, Vicenza, the Adige, and the Po. Its mouth, like that of the Adige, is obstructed by the sand banks which are common to both rivers. Fort Brondolo, where several canals or streams meet, is 3 miles from the sea by the Brenta and nearly $1\frac{1}{2}$ miles from the coast. When the river is swollen by rains, strong eddies are formed at the entrance.

The coast between Brondolo and the entrance of Port Chioggia has nothing conspicuous but the steeple of the small Madonna di Marina Chapel, and northward of this, Sottomarina Village and the Town of Chioggia.

Port Chioggia is at the embouchure of the Perognola Channel, which is fed by the waters of the lagoons and several smaller channels and reaches the sea between Fort St. Felice on the south and Fort Caroman on the southern end of Pelestrina Island on the north. This end of Pelestrina is bordered by a shoal, which reduces the channel into the port to a width of about 400 yards, though the forts are 800 yards apart.

Depths—Entrance.—The shore bank or bar fronting and crossing the entrance to the port has about $2\frac{1}{2}$ fathoms, and leads into a deep hole immediately northward of and almost touching Fort San Felice, where the depth in one place is as much as 13 fathoms; from thence, a narrow channel close along by the fort leads southward to the anchorage, which is well sheltered. The general depth in the port is from $1\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, though in places along the southern shore it is considerably deeper. Vessels lie southwestward of Fort San Felice; but it is desirable when a long stay is intended to warp inside the Perognola Canal, which is the real Port of Chioggia.

With the exception of Malamocco, Chioggia has the advantage over all the other lagoon ports of a greater depth of water at its entrance, which, however, is often impracticable; a heavy sea is raised by northeasterly, southeasterly, or easterly winds, and the current is frequently strong; it is always advisable to take a pilot.

Caution.—The depths on the bank fronting the entrance to the port have decreased (1912), and caution is necessary in crossing it.

Harbor works.—Breakwaters are being constructed eastward from the spur of the bank eastward of Fort San Felice and from Fort Caroman Breakwater. The passage between the light buoys marking the outer ends of the breakwater works and the shore are dangerous.

Mooring buoys.—Five mooring buoys for torpedo vessels, and one for a vessel of moderate size, are established in the port.

The town is built on an island and contains a population of about 29,000. It is traversed by a fine road and by a canal crossed by nine bridges; it contains several shipbuilding yards, and fishing is largely carried on. The various channels which meet at Chioggia and communicate with the Brenta, Malamocco, etc., are available for small coasting vessels only.

Tides.—It is high water, full and change, at Chioggia at about 10 h. 30 m.; the rise is from $2\frac{1}{2}$ to 4 feet at Malamocco.

Lights—Fort San Felice.—A flashing white light is exhibited, at 52 feet above high water, from a white ortagonal tower, over a red house, 24 feet high, in Fort San Felice, visible 11 miles.

Fort Caroman Breakwater.—An occulting green light is exhibited, at 26 feet above high water, from a cylindrical reservoir, painted

red and white in horizontal stripes, on a masonry base, 20 feet high, on the outer end of Fort Caroman Breakwater, visible 10 miles. The light is unwatched.

A fixed red light is exhibited, at 25 feet above high water, from an iron standard, 21 feet high, at the health office, on the eastern side of the north entrance to San Domenico Canal, and should be seen from a distance of 1 mile; it is unwatched.

Light buoys—South Breakwater.—A red light buoy, exhibiting a flashing red light, is moored about 1.2 miles east-southeastward of Fort San Felice Lighthouse, and marks the outer end of the works in progress for the construction of the South Breakwater.

North Breakwater.—A black light buoy, exhibiting a flashing green light, is moored about 1 mile east-southeastward of Fort Caroman Breakwater, and marks the outer end of the works in progress for the construction of the North Breakwater.

Shoal extended—Caution.—The $1\frac{1}{4}$ -fathom shoal on the western side of the channel in the inner harbor has extended about 55 yards eastward.

Vessels entering must keep eastward of a line joining Fort Caroman Light and the fixed red light at the health office.

Wreck—Light buoy.—The wreck of the steamer *Saturna* lies sunk near the North Dike.

A red conical light buoy exhibiting a red light has been established to mark the wreck. (Temporarily discontinued 1915.)

Spoil buoy.—There is a spoil buoy, red conical buoy, surmounted by a staff and ball, moored southeastward of the entrance to Chioggia, in about 9 fathoms water, distant 2.2 miles east-southeastward of Fort San Felice Lighthouse.

Buoys.—A conical buoy, painted black and white in horizontal stripes, and surmounted by a cone, marks the sandbank about 200 yards westward of San Felice Fort.

A spherical buoy, surmounted by a cone painted white and black in horizontal stripes, is moored about 800 yards west-northwestward of Fort San Felice Lighthouse.

Directions.—Vessels bound to Chioggia should approach the low coast with caution, being guided by the lead. The high land in the vicinity of Padua is rarely visible, and the two objects which first present themselves are generally the steeple of Pelestrina, about 2 miles northward of the entrance, and that of Chioggia, which is high and surmounted by a vane. Southward of Chioggia the steeples of Brondolo and Madonna di Marina Chapel, and on a near approach to Chioggia the Forts of San Felice on the south and Caroman on the northern side of the entrance will be seen.

Vessels detained by contrary winds or waiting for the flood tide anchor in a depth of 7 or 8 fathoms, mud and sand, off the entrance

about $1\frac{1}{2}$ miles from the shore, with Pelestrina steeple bearing about 336° , and the steeple of Madonna Church 238° ; but this anchorage can not be recommended except in fine weather, or with off-shore winds, as there is at other times a heavy sea. The lead should be kept constantly going by vessels approaching Chioggia.

Coast—Pelestrina Island.—Between Chioggia and Port Malamocco, the lagoon is protected seaward by Pelestrina, a narrow sandy island, 6 miles in length, thickly peopled and well cultivated. The part near Chioggia presents nothing remarkable, but northward of Pelestrina Village the church steeple of which is one of the most conspicuous on this coast, the island is covered with houses, and at the northern part may be seen the tower of Porto Secco, the church of San Pietro in Volta, the new tower and fort of San Pietro at the entrance to Malamocco, and several batteries.

A high sea wall of limestone extends along the shore and protects the inner channels and anchorage. The sandbanks along the shore of Pelestrina are changeable in form and extent, and the shallow parts become wider as Malamocco is approached.

Malamocco Island, known as Il Lido, extends 30° about $6\frac{1}{2}$ miles in an almost direct line from Port Malamocco to Port San Nicolo del Lido. The northern portion is highest, and from this port to the Pilot Tower near the southwestern end a sea wall protects the island from the heavy sea occasioned by southerly and easterly winds. The steeples of Malamocco and Poveglia at about 2.3 and 2.7 miles from the southwestern end of the island, the row of hotels facing the sea near Fort Santa Ma Elisabetta, the steeple of San Nicolo del Lido, 128 feet high, at the northeastern end, the towers of Venice behind, the forts at the extremities of the island, the Pilot Tower, and light-houses are the most conspicuous objects. Malamocco, like Pelestrina Island, serves the lagoon channels as an effectual barrier against the violence of the sea.

Peloroso Road.—This anchorage is off the entrance of Port Malamocco in depths of $6\frac{1}{2}$ to $8\frac{1}{2}$ fathoms, mud, sand, and shells, from 1 to 2 miles from the lighthouse on the North Mole Head. A fair summer berth for a large vessel is in about 7 or 8 fathoms with the pier-head light bearing 269° , and Poveglia steeple a little open eastward of Malamocco steeple. A convenient berth is with the pier-head light bearing 294° , distant 1 mile in 7 fathoms.

Peloroso Road is exposed to winds from between northeast and southeast; it is not advisable to anchor here in a large vessel, except in fine weather or to await high water for entering Malamocco; under other circumstances it is better to proceed to Piave Anchorage. Vessels should be quite prepared for a start when at anchor in this roadstead, which may be more easily quitted than other anchorages on the coast during bad weather.

Spoil buoy.—A spoil buoy, painted red, is moored in a depth of 10 fathoms, $3\frac{1}{4}$ miles 150° from the lighthouse on Malamocco North Mole.

A wreck is charted about $\frac{1}{2}$ mile southwest of the spoil buoy.

Venice, Main channel.—**Port Malamocco**, by far the most important and most frequently visited of the lagoon ports, is the entrance to the only passage for large vessels to Venice, about 7 miles distant. Its central position also gives it an advantage, as sailing vessels overtaken by strong northeasterly or southeasterly winds, which are very dangerous on this coast, and unable to enter the port, can always, in case of necessity, either anchor in Peloroso Road or seek shelter under the shore of Istria.

The port is at the outlets of the Fisolo, Rocchetta, and Spignon Channels, and has sufficient space for a number of vessels. One anchorage is on the southern side, in a depth of 5 or 6 fathoms, between San Pietro Channel and San Pietro Bastion, nearly 400 yards north-eastward of the latter. Another is more toward the northwestern part of the port, in about 4 fathoms, at the mouth of the Spignon Channel; and, in proceeding to it, vessels pass southward and westward of the beacons off Fort Alberoni. A third anchorage is at the entrance to the Fisolo Channel, northward of the Spignon.

Depths—Moles.—**The entrance** to the port is between the moles which extend seaward from the shore abreast Fort San Pietro on the south, and Fort Alberoni on the north; like all the ports on this coast, it is obstructed by sandbanks, which, besides diminishing the anchorage space, render access difficult in a sailing-vessel unless with a fair wind and fine weather.

The channel into the port with the leading marks on, carries 27 feet at low water, except at one part between the moles, 272° , distant 850 yards from the lighthouse on the North Mole Head, where a shoal about 200 yards in extent with a least depth of 19 feet has grown up; the passage southward and westward of this patch is about 80 yards wide in a depth of 27 feet; and, northward of it, 180 yards wide with from 27 to 28 feet water, the best channel and deepest water being toward the North Mole. There is, however, only 25 feet water near the North Mole, until about 200 yards length within its head. Vessels drawing 28 feet can enter at high water.

The entrance is between the two piers or moles, the northern one projecting seaward in a 109° direction upward of 1 miles from the shore of Fort Alberoni; the southern mole is shorter and its head bears 244° , 650 yards from the North Mole Head, the width between them, when in the channel, being about 450 yards. The stream, at times running 3 knots an hour between the moles, tends to scour the channel and keep it clear.

Naval vessels are not allowed to proceed to Venice without permission from the port admiral. It is therefore convenient to make fast to one of the buoys at Malamocca, where pratique must be obtained, and where the powder must be discharged if a vessel is going to the arsenal.

Beacons.—On the southern side of the harbor about 200 yards northwestward of San Pietro Bastion are two beacons, and on the land on the western side of the entrance to the Rocchetta Channel near Alberoni Bastion are other two beacons; these are diamond-shaped, on poles, and painted red and white in opposite quarters. The four beacons when in line bear 10° and 190° from each other, and when bound to or from the Rocchetta Channel, that line leads eastward of Alberoni Spit, the shoal ground extending from the west entrance point.

Buoys.—Inside the short mole, jutting out from the shore, just westward of Fort San Pietro, are two mooring buoys marked "N." lying parallel to the mole, and forming a berth for a vessel of 320 feet, moored head and stern. Four mooring buoys are established farther to the westward, Nos. 1, 3, and 5 forming two berths for large vessels, moored head and stern, and No. 4 a swinging berth for a vessel of about 300 feet.

Another mooring buoy, situated about 550 yards westward of the extremity of the short mole, is provided for swinging ships.

Pilots will not slip from these buoys until slack water, and it is impossible to tell the direction of the streams, which are strong and variable, without local knowledge.

Coal.—An average stock of about 20,000 tons is usually on hand at Venice. Steamers can coal either there or at Malamocco. Vessels coal in the stream from lighters, and about 400 tons per diem can be put on board. There is no coaling wharf for naval vessels.

Semaphore.—The semaphore and electric telegraph station is an isolated square building surmounted by a tower; it is about 80 feet above the sea and is called the Pilot Tower. It is situated at Alberoni, nearly 1 mile from the southern end of Malamocco Island, and is a remarkable object from seaward, being colored with alternate black and white horizontal bands, and in that respect differing from the uniform Italian system.

Tides.—It is high water, full and change, at Malamocco, at 10 h. 30 m.; springs rise from $2\frac{1}{4}$ to 4 feet. The stream enters by both the northern and southern channels, meeting near Poveglia Island. Their strength is very variable; in the Lido and Malamocco Channels it runs at times at the rate of 3 knots.

At Venice it is high water, full and change, at 11 h. 15 m. A strong southeasterly wind, during a spring tide, causes an extraordinary rise and sometimes overflows the quays of the town.

The tidal streams off Fort San Pietro are very strong; the ebb tide running south from Rocchetta Channel meeting that running north from San Pietro Channel forms strong eddies off the end of the short mole extending from the fort; great caution is necessary when passing this point, as there is a strong set toward the northern pier.

Lights—South Breakwater.—A flashing red light is exhibited at 52 feet above high water from a concrete tower, 45 feet high, on the outer extremity of the South Breakwater at Port Malamocco, visible 12 miles.

North Breakwater.—A flashing green light is exhibited at 41 feet above high water, from an octagonal building, 34 feet high, on the outer extremity of the North Breakwater of Port Malamocco, visible 12 miles.

Fog signal.—A siren, worked by compressed air, is sounded. (See Light List.)

San Pietro Fort Mole.—Two fixed lights, placed vertically, the upper red and the lower white, are exhibited, at 30 and 23 feet above high water, from an iron framework, 30 feet high, on the outer end of the mole extending northward from the western end of San Pietro Fort; the red light is visible 6 miles and the white light 9 miles.

Rocchetta.—A flashing group white light is exhibited at 81 feet above high water, from a white cylindrical tower over dwelling, 76 feet high, on the sea wall southwestward of Fort Alberoni, visible 14 miles.

Spignon.—An occulting red light is exhibited at 49 feet above high water, from a white conical tower, 43 feet high, with a dwelling adjoining, situated on the southern side of Spignon Channel Entrance, visible 7 miles.

Spignon and Rocchetta lights in range 286° lead between the moles.

Light buoy.—A black light and bell buoy, exhibiting a fixed red light, is moored in Port Malamocco Entrance, about 800 yards westward of the North Breakwater Lighthouse, and just inside a patch with $3\frac{1}{2}$ fathoms water.

NOTE.—Temporarily replaced by a red cylindrical light buoy showing a flashing red light.

Pilots.—The pilot boats fly a blue-white-blue flag at the mast-head and have the letter P on the sails and the word "Pilota" on the bow and stern.

Government regulations oblige vessels to take a pilot at Malamocco when bound to Venice or up any of the various channels. A pilot taken on board at the port or at sea is not allowed to pilot a vessel farther than the town of Malamocco, where another pilot for Venice must be employed and where he must be discharged on the vessel's way down.

Quarantine station.—The quarantine station is situated in the channel west of Poveglia.

Venice.—The city of Venice is built on 72 islets or shoals, on foundations of piles and stone. It stands near the center of a lagoon extending from Brondolo on the south to near Piave, a length of 30 miles by a breadth of 5 miles. The city is divided into two unequal portions by the "Canalazzo" or Grand Canal, the course of which is northwestward and southeastward, in the form of the letter S; it is further intersected by 146 smaller canals, termed "rii," which are crossed by 306 bridges. Steamboats run every few minutes between Garden Island, at the southeastern extremity of the city, and the northwestern end of the Grand Canal, calling at various intermediate points. The small canals serve as streets, on which some 9,000 gondoliers or boatmen gain their livelihood.

Venice is the best built and, next to Trieste, the most populous city in the Adriatic, and in 1913 contained a population of about 166,971. It is connected with the mainland at Mestre by a railroad viaduct 3,936 yards long; the railroad station is in the northwestern part of the city, on the northern side of the Grand Canal. To facilitate communication with the mainland, there is a tramway line to and from Padua and Fusina, in connection with steamers plying regularly six times a day to and from Fusina and Venice. Other similar projects are in progress.

The pride of the Venetians is the Piazzzi di San Marco, distinguished by its stately edifices. The cathedral of San Marco is one of the finest in Europe; its historic and formerly conspicuous tower fell on July 14, 1902, previous to which it was a distinguishing mark to vessels making the port.

Hospital.—There is a very fine civil hospital, available for foreign seamen at a small charge, by consular request.

Communication.—Venice is in direct communication with Alexandria and the East by P. and O. steamers bimonthly, calling at Ancona and Brindisi en route. With Trieste, thrice weekly by Austrian Lloyd's steamers. With Bari, Brindisi, Corfu, and Sicily, thrice weekly by the Italian Steam Navigation Co.'s steamers.

Trade.—The principal imports are sugar, coffee, indigo, wine and spirits, silk, woolen and cotton yarn and goods, grain, coal, hides, metals, oils, etc. The exports are glassware, silk, hemp, wax, etc.

Docks.—See Appendix.

Repairs.—The firm of E. G. Neville & Co. can effect repairs to hull or machinery; they have a 40-ton crane, steam hammer, turning lathes, etc., and can make iron masts of any size, build and fit steam launches, etc.

Supplies.—Water of good quality may be procured from the Waterworks Company. Water is obtained from the springs of St. Ambrozio Treviso. Rain water is preserved in cisterns and recourse is also had to the Brenta River. Several artesian wells are sunk in the town; water is also brought in from the Sile River by pipes along the railroad viaduct. Naval vessels are usually accommodated with a Government tank vessel on application to the naval authorities.

Supplies of all kinds are plentiful and good.

Coal.—Naval vessels are recommended to telegraph beforehand, if possible, their coal requirements and probable date of arrival, in order that permission may be obtained to freely enter Malomocco Harbor, and thence proceed to the Canal of San Marco.

Time signals.—A group of six electric lights at the eastern turret of San Giorgio Island, about 82 feet above the ground, is switched on at noon, standard time, or 23h. 0m. 0s., Greenwich mean time, and switched off at 0h. 5m. 0s., standard time, or 23h. 5m. 0s., Greenwich mean time. The signal should be seen from a distance of about 3 miles.

A similar signal is made from the north wall of the highest part of Sylos Factory at the naval station.

Radio.—A radio station, call letters I C Z, with a wave length of 600—1,800 meters, is established, for military and commercial purposes, at Venice (Carbonera).

This station has a Marconi apparatus and is under the control of the minister of marine.

Storm signals are hoisted at a flagstaff (12 feet above the sea) on the extremity of the mole northward of San Giorgio Island, and indicate as follows:

- | | |
|--|--|
| 1. A black drum----- | Probable succession of sudden gales from various quarters. |
| 2. A black cone, apex upward. | Probable sudden gale from the north. |
| 3. A black cone, apex downward----- | Probable sudden gale from the south. |
| 4. A black cone, apex upward, over a black drum----- | Probable storm from the north. |
| 5. A black drum over a black cone, apex downward---- | Probable storm from the south. |

The signals can be seen only by vessels lying in the basin of San Marco and in part of the Giudecca Channel.

Current signals.—From the Flagship of the Admiral stationed at Venice, the following signals are made with reference to the tidal movement:

| | |
|---------------------------------------|--|
| A ball at the signal yard----- | Indicates that the tidal stream is running in. |
| A cone at the signal yard----- | Indicates that the stream is running out. |
| The ball or cone hoisted close up. | Indicates that the stream is at its maximum strength. |
| The ball or cone hoisted half-way up. | Indicates that the stream is running at a moderate rate. |
| The ball or cone quite low down | Indicates that there is slack water. |

Pilots are obtainable here for the Lido Entrance as well as for Malamocco.

Malamocco to Venice—Depths.—The Malamocco Entrance, the main approach to Venice, is available at high water for vessels of 28 feet draft, but a pilot should be employed for vessels of heavy draft.

In 1904 the Rocchetta, Malamocco, San Spirito, and Orfano Channels carried a depth of 30 feet all the way up to Venice except for about $\frac{1}{4}$ mile at the southern end of the Rocchetta Channel, opposite the harbor master's office, where there is 27 $\frac{1}{2}$ feet. The San Marco Channel has from 22 to 30 feet.

NOTE.—The chart shows 4 $\frac{3}{4}$ fathoms shoal in San Spirito Channel and 3 $\frac{1}{4}$ fathoms shoal in the Orfano Channel.

Directions.—In making Malamocco in hazy weather, the entrance is seldom first seen, as the lighthouses are then not easily distinguished. In clear weather, by day, the buildings of Venice may be seen. The most conspicuous object to the northward of the port is the pilot tower; about 400 yards westward from the tower is a quoin-shaped clump of trees. To the southward are the church of San Pietro in Volta and Porto Secco, with short belfries, and the campanile at Pelestrina and Chioggia.

On nearer approach, the tall campaniles of Malamocco (108 feet) and Poveglia (124 feet) show up to the northward, and then gradually the entrance with the lighthouses and the large, low forts of San Pietro and Alberoni, with shipping (a battleship in the reserve is generally inside).

Enter between the breakwaters with Spignon and Rocchetta Lighthouses in range, 286°, and keep on this range, which leads northward of the light and bell buoy (or temporary light buoy showing red), until Fort San Pietro Mole Lighthouse bears 238°, and thence

keep in mid-channel. There is a least depth of 29 feet in this route, but with extraordinary low tides there may be a foot less water. When within Fort San Pietro Mole steer for the anchorage.

If entering the Rocchetta Channel, the beacons on either northern or southern shore in range will lead eastward of Alberoni Spit, but the set of the tide should be carefully watched in turning into this channel. From thence the Rocchetta, Malamocco, San Spirito, and Orfano Channels, the whole of the way to the city, are marked by clusters of piles which serve to support the banks and preserve the channel.

After turning into Rocchetta Channel the navigation of vessels drawing 26 feet and up to 350 feet in length is not considered difficult. Vessels can not pass one another, and caution is required when passing the openings of any of the smaller channels, especially during spring tides. The deep-water channel is not very broad, and the best water is to be found toward the eastern side all the way up. The narrowest part of the channel is off San Clemente, where it would be most dangerous for steamboats to pass or overtake steamers, since the water becomes piled up against the vessel's side and rushes with great force along it and toward the stakes on the banks.

Owing to the very strong currents at spring tides vessels of very heavy draft are preferably navigated at neap tides, there being only a difference of about $1\frac{1}{2}$ feet.

Caution.—Vessels entering the port of Malamocco with a strong northeasterly wind, which has been blowing for some time, should get well to the northward, and bring the head of the southern breakwater to bear about 268° ; steer in on this line, going slow until Malamocco Light is abeam, when speed should be increased and the vessel headed up the entrance. If this precaution is not taken there is great danger under these circumstances of the vessel's head being thrown around toward the northern breakwater by the wind, sea, and current.

Large vessels should go up the channels to Venice at half tide, if practicable, so that in case of taking the ground it will not be difficult to get off with the rise of tide. In the minor channels stakes mark one side only. There is always a stake to mark the junction of two channels. The channels are to be navigated at slow speed, and great attention paid to boats and lighters.

At night.—The lights are available for entering, substituting light for lighthouse in the preceding directions, but it is not recommended that vessels of other than light draft should enter without a pilot.

Sailing vessels.—If off Port Malamocco in the evening and not intending to enter, and if the breeze is too fresh for anchoring, it is advisable in a sailing vessel to keep 10 or 12 miles to the eastward

under easy sail, taking care when standing in not to allow the vessel to be set too near Maestra Point by the southwesterly current. Time of tide, time of departure of the fishing fleet, and draft of water must be considered in entering this port, especially if proceeding to Venice. It is not prudent for a sailing vessel to enter with strong northeasterly or southeasterly winds.

Anchorage.—The following are berths for naval vessels at Venice: Off the public gardens, at low water, a vessel would rest on soft mud in $25\frac{1}{2}$ feet water. Opposite San Giorgio and abreast the monument, on the northern side of the channel, with 25 feet at low water on inner side of the vessel. Off the customhouse opposite San Marco Square, in 28 feet water; this is the best berth.

Vessels lay parallel to the bank, at their own anchors, stern secured to buoy. There is no danger lying at these berths, and by dropping the anchors a little farther out than is usually done, deeper water is found, but this rather interferes with the fairway and is only done on special occasions.

Small naval vessels are permitted to moor head and stern to buoys off Garden Island in the San Marco Channel, or farther up, to a buoy off San Marco Square, with the stream anchor astern to prevent swinging with the stream.

Mooring buoys for large and small vessels have been placed in San Marco and Guidecca Channels.

Arsenal.—The military port or arsenal takes in the Maraffi Channel from St. Elena; all explosives have to be discharged before going in; this condition does not apply to other parts of the anchorage at Venice. The shallow ground to the southward of St. Elena is being dredged.

Offing Bank—Cortellazzo Bank.—This extensive bank of gravel and weeds extends in an east-northeastward and west-southwestward direction between Port Malamocco and the town of Caorle at from 7 to 12 miles from the coast. The bank is but a slight elevation of the bottom about 1 mile wide, extending 25 miles parallel with the shore and having depths of from 10 to 12 fathoms; within the bank, the depth is from 10 to 13 fathoms, and outside it, from 13 to 15 fathoms, sand. It is said to afford some protection from the sea to the anchorages on the coast.

Spoil buoy.—A red conical buoy, surmounted by a ball, is moored about $3\frac{1}{4}$ miles east-northeastward of Malamocco North Breakwater lighthouse to mark the place for deposit of spoil.

Measured distance.—Northeastward of Port Malamocco is a measured distance of 15,306 feet, or $2\frac{1}{2}$ miles nearly; the running mark is San Pietro in Volta steeple in range with the South Break-

water lighthouse, 225° ; the southwestern limit mark is Poveglia and Malamocco steeples in range; and the northeastern limit mark San Giorgio and San Lazzaro steeples in range; the depth on the course is from $5\frac{1}{2}$ to 6 fathoms.

Port San Nicolo del Lido is at the northern end of Il Lido or Malamocco Island. It was formerly, and probably will be again, the chief port of the lagoons, but at present the depth in its entrance is 21 feet at low water, the deepest channel being on the port hand going in. Improvements are in progress.

Breakwaters.—The entrance to the port is formed by two breakwaters, the northern of which extends from the shore at Sabbioni Point in a southwesterly direction, and curving gradually seaward until the outer part takes a southeasterly direction, the total length being $2\frac{1}{4}$ miles. The southern breakwater extends from the old mole at Fort San Nicolo in a southeasterly direction $1\frac{1}{4}$ miles. The entrance between them is $\frac{1}{2}$ mile wide.

Depths.—During high water, with no swell on, vessels of 20 feet draft can proceed through the channel leading to Port Lido, between the breakwaters. This channel is situated a short distance from the western breakwater, and care is necessary in approaching it from seaward, as the entrance is only about 400 yards in width between the shoals, formed by detritus, near the breakwaters, decreasing to about 200 yards northward of Fort San Nicolo. There is reported to be a least depth of 24 feet in the channel from Lido to Venico.

The distance from San Nicolo Point to Venice Arsenal is $1\frac{1}{4}$ miles by the channel, which is deep throughout, the shoalest part south-eastward of La Certosa having 23 feet. The depth along the shore of Malamocco Island within the port and close to Fort San Nicolo is 6 and 7 fathoms, sandy bottom; here it is customary for vessels after dropping an anchor to lay out a cable to the southeastern shore.

Lights—Southwest Breakwater.—A group flashing red light is exhibited, at 20 feet above high water, from a red framework on the outer end of the Southwest Breakwater.

Northeast Breakwater.—A group flashing green light is exhibited, at 56 feet above high water, from an octagonal two-storied concrete tower, with a domed top, and a double veranda on the seaward side, 56 feet high, on the outer end of the Northeast Breakwater, visible 7 miles.

Range lights.—An occulting light, showing red, white, and green sectors, is exhibited, at 70 feet above high water, from an iron framework on the southeast coast of Murano Island, visible 13 miles. (For the sectors of the light, see light list and chart.)

An occulting white light is exhibited, at 26 feet above high water, from a concrete beacon on the north bank of the channel about 600

yards northward of Fort San Nicolo semaphore, and should be seen from a distance of 10 miles.

The two last-mentioned lights are 3,460 yards apart, and in range, bearing 301° , lead into the entrance to the port.

Channel lights.—A flashing green light is exhibited from the same concrete beacon as the occulting white light just mentioned.

A flashing green light is exhibited from a concrete beacon about 300 yards northeastward of Fort San Andrea.

A flashing red light is exhibited from a concrete beacon on the southern bank of the channel, 240 yards northward of Fort San Nicolo Semaphore.

A flashing red light is exhibited from a concrete beacon on the south bank of the channel, 500 yards northwestward of Fort San Nicolo Semaphore.

Light buoys.—A light buoy is moored about 1,400 yards southeastward of the southwestern breakwater lighthouse, and three light buoys are moored on the southwestern side of the channel between the breakwaters. These buoys, each of which is surmounted by a red cone, and exhibits a flashing red light, are left on the port hand entering.

Four light buoys, each of which is surmounted by a black cone, and exhibits a flashing green light are moored on the northeastern side of the channel, and are left on the starboard hand entering.

Mooring buoys.—Four buoys have been placed about 130 yards northeastward, eastward, southward, and southwestward of the head of the southwestern breakwater, for mooring boats landing material for completing the breakwater and two warping buoys are moored, one on each side, about 800 yards inside the entrance.

Buoy.—A black spherical buoy, surmounted by a cone, painted black and white in horizontal stripes, is moored about 1 mile eastward of Fort San Nicolo Semaphore to mark the bank between Lido and Treporti Channels.

NOTE.—Buoys inside Fort San Nicolo are not mentioned herein, nor are they shown on the chart.

Dredging operations are in progress in Port Lido Channel; the dredger, which exhibits the "Not under control" signal, is moored ahead and astern in the direction of the streams, and can be passed on either side at the slowest possible speed. In heavy weather the dredger will go into San Nicolo del Lido Road or San Marco Channel.

Semaphore.—There is a semaphore on the northeastern extremity of Fort San Nicolo painted in black and white squares; attendance at this station is not continuous.

Tides.—It is high water, full and change, in Port Malamocco about 10 h. 30 m., rise $2\frac{1}{4}$ to 4 feet. The tide enters by both the north-

ern and southern passes, the streams meeting near Poveglia Island, a strong southeast wind during a spring tide causes an extraordinary rise which at times overflows the quays of the town. The strength of the current is variable in the channels and sometimes attains a rate of 3 knots.

Pilots for the Lido Channel can be obtained at Malamocco.

Port San Erasmo, the entrance to which is so obstructed by the sandbank of Port San Nicolo del Lido that it is only practicable for boats or vessels of very light draft in fine weather and at high water. The entrance is 1,200 yards eastward of Fort San Nicolo. San Erasmo Island is well cultivated.

Tre Porti Channel runs up in a northeasterly direction towards the channels and lagoons at its head, and leads directly to Burano, and from thence communicates by canals with Caorle and Venice and other places in the interior. The passage in is between the northern breakwater of the entrance to Port San Nicolo del Lido and the shoal extending from St. Erasmo on the west; a depth of about $1\frac{1}{2}$ fathoms can be carried over the flat in its entrance, and within it the depths range from $1\frac{1}{2}$ to 3 or 4 fathoms.

Offing—Anchorage.—Vessels may anchor in a depth of from 7 to 9 fathoms, about $2\frac{1}{2}$ miles from the shore, anywhere along the coast between Port Lido and Piave Vecchia. Small vessels anchor nearer the shore in about 4 fathoms, sand, mud, and shells.

The best anchorage is about 8 miles eastward of Fort San Nicolo del Lido Church and about $2\frac{1}{2}$ miles from the shore; the depth is 9 fathoms, sand and mud. Here Piave Point gives some shelter in a bora; and this is a good anchorage with northerly or westerly winds, but bad with southeasterly and southwesterly winds which send in a considerable swell, and then Peloroso Anchorage is to be preferred. Easterly and southeasterly winds, however, with good ground tackle, need not be feared in case of necessity, though it would always be advisable, if the weather should look threatening from the eastward, to weight and seek shelter under the coast of Istria.

In approaching the anchorage from the northeastward in clear weather after making the land eastward of Venice, a vessel should be guided by San Nicolo Church Tower (128 feet high), and by Piave Vecchia Lighthouse, bearings of which will indicate a vessel's approach to the shore.

Coast—Port Piave Vecchia is 7 miles eastward of Port Lido. The coast between consists of sand hills. Small boats have no difficulty in landing during fine weather. The port is a winding channel about 60 yards wide, and, extending inland, communicates with other channels. Vessels drawing 7 feet can enter at high water with local knowledge.

It is the ancient mouth of the Piave and receives the waters of the Sile River, which has a depth of 10 feet as far as Treviso, about 20 miles from the sea. Vessels anchor in any part of the channel and secure to the shore against the freshets from the Sile. The Piave rises at the foot of Mount Paralba and is navigable from the sea at Port Piave Vecchia by small craft up to the village of Noventa, about 14 miles.

The entrance to Piave Vecchia may be recognized by the conspicuous lighthouse.

Light.—An occulting white light is exhibited at 146 feet above high water from a white circular tower over a dwelling 136 feet high, situated on the western entrance point of Port Piave Vecchia, visible 18 miles. The lighthouse is a telegraph station.

Port Cortellazzo, about $7\frac{1}{2}$ miles eastward of Piave Vecchia, is the mouth of the Piave River, which communicates with Caorle and the lagoons by various channels, navigated by vessels of about 3 or 4 feet draft. The entrance is obstructed by sand banks on either side; between them is a narrow channel with a depth of about 3 feet at low water; at high water, when no range marks can be distinguished, the entrance is more difficult. It can only be entered by those locally acquainted.

The position of this little port may be known by its being nearly midway between the lighthouse of Piave Vecchia and Caorle Church steeple.

The anchorage off the port is in a depth of about 8 fathoms, mud and sand. Vessels may anchor anywhere about 2 miles from the shore between Piave Vecchia and Caorle.

The coast between Cortellazzo and Caorle, 7 miles farther eastward, consists of sand hills scarcely above the level of the sea. Under favorable circumstances it may be approached by the lead; but in winter it is advisable for sailing vessels to give it a wide berth, as southeasterly winds, which are of long duration, blow right on it.

Port Santa Margherita is the mouth of the Livenza River which is fed by the waters from the Friuli Mountains and communicates with Venice, Treviso, etc. The entrance, about 200 yards wide, with a depth of little more than 3 feet at low water, is over the flat which fronts the shore. The stream of the river and strong southeasterly winds occasionally alter the direction of the channel.

The small craft which visit this little port anchor off-shore in from 1 to 2 fathoms, muddy bottom.

Caorle.—This town is on the seashore, about 1 mile northeastward of Santa Margherita, and its church steeple (light), 162 feet high, is the only conspicuous object on this coast; though, when near the land, some large buildings may be seen about 2 miles northeastward

of it. A stone embankment protects the shore abreast of the town, and on a projecting point northeastward of it is the church of Madonna degli Angeli. Water and small supplies of provisions of all kinds are obtainable at Caorle.

Light.—An occulting white light is exhibited at 41 feet above high water, from Caorle Church Steeple, visible 10 miles.

Grado Lagoons, also known as the Marano Lagoons, commence at Caorle; they resemble those of Venice and embrace an extent of 30 miles from east to west. Most of the 25 islands, of which the chief is Grado, have but few inhabitants.

Port Falconera is at the mouth of the Lemene River. The port runs in for about $1\frac{1}{2}$ miles and has from about 8 feet water at the entrance to an average of 4 fathoms within, but the bed of the river is very uneven, and in places there are depths of 7 and 8 fathoms. The port affords shelter from all winds for a large number of vessels of the size capable of entering. It is convenient for loading and unloading, and the holding ground is good. The passage in is marked by stakes on either side, and there are two openings through them—one, close eastward of Caorle with 6 feet water; the other, about 1 mile northeastward of Caorle, over the flat, which apparently has less water. The former is more frequently used.

The port has water communication with Portogruaro, the Livenza, Caorle, Venice, Treviso, etc.

Lights.—A flashing red light is exhibited at 19 feet above high water, from a lamp-post, erected on an iron base painted in white and red bands, on the western side of the entrance to the port.

A flashing green light is exhibited, at 19 feet above high water, from an iron structure with black and white stripes on piles, on the shoal on the eastern side of the entrance to the port.

These lights are visible 5 miles for the green and 6 miles for the red light.

The coast between ports Falconera and Baseleghe, 3 miles farther northeastward, is a low, sandy shore bordered by shallow water for a distance of $\frac{3}{4}$ mile seaward, parts of which are nearly dry at low water. Vessels may anchor in a depth of about 5 fathoms, good holding ground, at $1\frac{1}{2}$ miles from the shore, for temporary shelter from a westerly gale or from heavy northerly or northeasterly winds, but with onshore winds this anchorage is not recommended.

The entrance to the small port of Baseleghe is barred by a sand bank, which at times is nearly awash, and is only accessible to boats in fine weather and at high water. Caorle Church steeple to the westward is a guide to the position of this place.

The coast between Baseleghe and the mouth of the Tagliamento River, $4\frac{1}{2}$ miles eastward, consists of low sand hills and forms a point

projecting considerably near where that river flows into the sea; a few scattered trees alone breaks the uniformity of the view. Between the Tagliamento River and Lignano, $3\frac{1}{2}$ miles farther north-eastward, the coast falls back, forming a bay completely exposed to southeasterly winds; it is very low and bordered by shoals, which render access difficult even for boats. Vessels sometimes anchor temporarily about 2 miles from the shore in a depth of $5\frac{1}{2}$ fathoms, clay bottom.

Tagliamento Point and River.—The Tagliamento River communicates with Latisana, 9 miles northward of its mouth, and is navigable by boats for about 13 miles. The entrance between two shifting sand banks is only a few fathoms wide and is nearly dry at low water. The position may be recognized by Caorle and Marano Church steeples, the latter a low, square tower north-northeastward nearly 8 miles from the entrance, and by the low projecting point of Tagliamento, which is considered the western boundary of the Gulf of Trieste on this shore.

Light.—An occulting white light is exhibited, at 72 feet above high water, from a white circular tower over a two-storied house, situated on Tagliamento Point, visible 14 miles.

Port Lignano is at the entrance of the Stella River; it runs in upward of 1 mile, with an average breadth of 600 yards, and being from 20 to 25 feet deep, with a little under 10 feet in the entrance channel, is the best and most useful port on the Friuli coast. It communicates by channel with Marano and Muzzana and by the Stella with Palazzolo.

The best berth in the port is off the mouth of the Marano Channel, where vessels moor with open hawse to the southward and are completely sheltered.

The entrance to the port, about 500 yards wide, is fronted by an extensive shallow bank, which extends southward $1\frac{1}{2}$ miles from the customhouse, with passages through it for small vessels. Those unable to stem the ebb tide, which after heavy rains is rapid, usually anchor at the entrance opposite the buildings and old battery on the port hand, but the anchorage here is exposed to winds from seaward.

The port may be recognized by a remarkably large pine tree at Pineda westward of the entrance, by the customhouse at Lignano, and a conspicuous two-storied house, painted red, on the western side of the entrance, by the customhouse of St. Andrea, and by the low tower of Marano. The deeply serrated outline of the Friuli Mountains will be seen in the background. The low coast in the neighborhood of Lignano should be cautiously approached by the lead and not within the distance of about 2 miles unless the entrance is seen.

Light.—A fixed white light, elevated 19 feet above the sea, and visible 5 miles, is exhibited near the customhouse.

Buoys.—The entrance to the port is indicated by a conical buoy with staff and cylinder, painted red and marked No. 1, situated on the western side of the channel nearly 1 mile 154° from the customhouse.

Five conical buoys are placed about 1 mile off-shore and some 1,400 yards apart from eastward of Port Lignano entrance to westward of Port Buso Entrance and mark the fishery limits.

Directions.—For entering the port a pilot or local knowledge is required. It is imprudent to attempt to work into Lignano against a fresh breeze and ebb tide. A vessel should then anchor about 2 miles from the entrance, in a depth of 5½ or 6 fathoms, good holding ground, with Marano steeple bearing about 356° and Tagliamento Point 244°.

Port St. Andrea.—The small harbor of St. Andrea is about 1 mile eastward of the entrance to Lignano, from which it is separated by an extensive shallow named the Martignano Bank. About 6 feet water may be carried through the entrance.

Coast.—Between Tagliamento Point and Port Grado, 11 miles apart, the low coast consisting of sand hills, forms a bay receding nearly 4 miles, with a depth of about 5 fathoms at the distance of 2 miles off. About midway is Port Buso, the frontier port between Italy and Austria. It is low, and shallow water, 3 fathoms and less, extends about 1 mile off.

CHAPTER V.

PORT BUSO TO MERLERA POINT.

Port Buso communicates with and receives the waters of the Anfora, Ausa, and Indermur Rivers, but is only suitable for small coasters, which go through the channels to Cervignano, an Austrian Village, about 10 miles up the Ausa River, or to Port San Giorgio di Nogaro, in Italian territory.

The banks extending $\frac{3}{4}$ mile off the entrance have less than 6 feet water, but a narrow channel, with $1\frac{1}{2}$ fathoms least water, leads into the port, where there are depths of from $2\frac{3}{4}$ to $4\frac{3}{4}$ fathoms. Marano Steeple, about 5 miles northwestward, and Grado Steeple, $5\frac{1}{2}$ miles southeastward, are good marks. There is an Italian customhouse with a long wooden landing jetty extending northward from it, on the western side of the port, and an Austrian customhouse with a wooden jetty westward of it, on Port Buso Island, on the eastern side, and a little farther seaward.

Light.—A fixed light, showing red and white sectors, is exhibited, at 15 feet above high water, from a post 9 feet high, at the head of the jetty on Port Buso Island; the white light is visible 4 miles and the red light 3 miles. (For the limits of the sectors, see Light List and Charts.)

Buoys.—A white can buoy, surmounted by a cone, point downward, is moored in $2\frac{3}{4}$ fathoms on the eastern side of the entrance to the port. On the same side of the entrance channel are a group of piles and three red spar buoys. The buoys and the piles are left on the starboard hand entering.

Outer anchorage.—There is open anchorage in about $4\frac{1}{2}$ fathoms water with the Austrian customhouse bearing about 329° , distant $2\frac{1}{2}$ miles.

Caution.—It is not safe to enter or leave the port during fresh southeasterly winds, as there are then heavy breakers at the entrance.

Supplies.—No provisions can be obtained at the port, but they are procurable from Marano (about $1\frac{1}{2}$ hours by boat with a favorable stream). There are some artesian wells with good but somewhat ferruginous water near the Italian customhouse.

Communication.—A small Austrian steamer runs weekly between Cervignano and Trieste.

Anfora.—The small port of Anfora is only separated from Port Buso by a sandbank which uncovers at low water and extends $1\frac{1}{2}$ miles eastward from the point on which stands a fort. There is a depth of about 3 feet only at the entrance of this port, and 16 feet, mud, within.

Port Grado communicates by water with Buso, Marano, and Aquilea; it is formed by openings through the banks and by the waters of the lagoons which surround the village of Grado. The Orio Bank on the west and the banks fronting the port, extend upward of 1 mile off-shore, and a passage through, dredged to a depth of 10 feet, leads in to a depth of $5\frac{1}{2}$ fathoms, mud and clay bottom. The banks are effected by freshets from the lagoons and by strong winds from seaward.

The population of Grado may be about 4,000, largely engaged in the tunny fishery. Entering Port Grado the red beacons should be left on the starboard and the black beacons on the port hand.

Telegraph cable.—A telegraph cable runs between Grado and Cittanuova, on the coast of Istria.

Lights.—On the eastern side of the entrance to Port Grado a fixed red light (unwatched) is exhibited, at an elevation of 24 feet above the sea, from a red iron framework structure, in a depth of 10 feet water; it is visible 5 miles.

Harbor lights.—A fixed red light is exhibited, at 15 feet above high water, from the head of the embankment northward of Grado Village, visible 3 miles; it is unwatched.

A fixed white light is exhibited, at 21 feet above high water, from the southern end of the eastern embankment at the entrance to Belvedere Channel, visible 5 miles; this light can not be lighted in heavy weather; it is unwatched.

Buoys.—The entrance channel into Port Grado is marked by three red spar buoys, which are left on the starboard hand entering, and by two black conical buoys, which are left on the port hand entering. The buoys are additional to the piles.

Signals.—Traffic signals are shown daily, from sunrise to sunset, from a signal mast at the northern entrance to the harbor channel.

Mula di Muggia Bank.—This bank, within the 3-fathom curve, extends $1\frac{1}{2}$ miles from the shore between Ports Grado and Primero and dries for over 1 mile of that distance; the bank is reported to be extending in a southwest direction. Vessels should be cautious in approaching it and keep the lead going, especially in thick or hazy weather.

Light.—In about 10 feet of water on the southern extremity of Mula di Muggia Bank with Barbara Church bearing 347° , distant 2.9 miles, stands an iron framework structure 28 feet high, from which

is exhibited, at an elevation of 23 feet above the sea, a fixed white light (unwatched), visible 7 miles.

Port Primero lies $3\frac{3}{4}$ miles eastward of Grado; the entrance is through shallow openings in the sandbanks by which it is surrounded, but within the water is deeper, being 3 fathoms. The object by which the position of Port Primero may be recognized is Grado Steeple.

Vessels entering Port Primero should leave the red piles on the starboard hand, and the black piles to port; the outermost piles are surmounted by a cross.

Sdobba Point and port.—At about 4 miles eastward of Port Primero, and immediately westward of Sdobba Point is the embouchure of the Isonzo and Isonzato Rivers, named Port Sdobba, which communicates by the inland waters with Primero. Its entrance has less than 3 feet water, and like the whole of this coast it is encumbered by sandbanks, which, by frequent changes, alter the depth and breadth of the passage. Fine weather is required for boats entering Port Sdobba, as the approach is dangerous when there is the least break on the shoals.

Sdobba Point is low, projecting a long way eastward, and is surrounded by shallow water extending more than 1 mile offshore; it is easily recognized, being the eastern extremity of this part of the coast and forming the southwestern point of Panzano Bay. Aquilea steeple may be seen $2\frac{1}{2}$ miles northwestward of it, and the village of Monfalcone on an eminence $5\frac{1}{2}$ miles to the northward.

Wreck.—The wreck of a sailing vessel, with two masts showing above water (1913), lies sunk southward of Sdobba Point on the bearings:

Duino Light 15° , distant 4 miles.

Santa Croce Church 74° .

Panzano Bay, or Sacca di Panzano, recedes about 3 miles in a northwesterly direction from a line drawn between Sdobba Point and Duino; it has a depth of $5\frac{1}{2}$ fathoms, decreasing toward the shore all round, muddy bottom. The shore on the western side and at the head of the bay is very low and rendered inaccessible by sandbanks and shallow water to other than small craft; on the northeastern shore high land commences, and about Duino the depth of 4 or $4\frac{1}{2}$ fathoms is found close inshore.

Several streams run into the bay, of which the small opening named Port Rosega, a little channel between two piers with 4 feet water, and the Timavo River are the chief.

Works were in progress (1905) for deepening the channel leading to Port Rosega to a depth of 13 feet; also to form a new channel from the sea to be continued to Monfalcone, in which the depth was eventually to be $18\frac{1}{2}$ feet.

There is anchorage in a depth of 5 or $5\frac{1}{2}$ fathoms, mud, in the central part of Panzano Bay.

Port Rosega.—The speed of steamers in the channel between Port Rosega and Monfalcone City must not exceed 2 knots until new regulations.

Light.—A flashing green light is exhibited, at 23 feet above high water, from a red iron post with platform above a red cylindrical hut, 18 feet high, on the East molehead of Port Rosega, visible 4 miles; the light is unwatched.

Lightbuoy.—A white lightbuoy, exhibiting a fixed red light, is moored on the western side of the entrance to the western approach channel into Port Rosega.

Timavo River.—The mouth of this river is $1\frac{1}{2}$ miles southeastward of Rosega and under a steep rocky eminence, on the summit of which is Duino Castle. It is well sheltered from all but southerly and southwesterly winds, which raise a considerable swell. It is through this river, which is very shallow in the entrance, that Venice and the whole of Friuli are largely supplied with grain exported from Trieste.

The Timavo River flows into the sea through an extensive shifting sandbank, about 3 miles north-northeastward from Sdobba Point. The entrance is between this bank and the shore, and parallel with the latter. The depth at the outer part is 3 feet, but it increases within to 9 feet, sand and mud. The position of the entrance is easily recognized, being opposite a walled inclosure on a hill a small distance inland and about $\frac{1}{2}$ mile northwestward of Duino village.

Port Duino.—The village and castle of Duino stand on a rocky height at the foot of which is the port, a little creek protected by a short mole; the depth at the entrance is 15 feet, with about 3 feet, muddy bottom, within. Southwesterly winds cause a swell inside.

Light.—A fixed light, showing white and red sectors, is exhibited, at 19 feet above high water, from a green lamp-post, 9 feet high, on the head of the mole; the white light is visible 4 miles, and the red light 3 miles. The light is unwatched. (For the limits of the sectors, see Light List.)

The red sector covers the shoal which extends off the mouth of Timavo River.

Lifeboat.—A lifeboat is stationed at Duino.

The coast between Duino and Trieste, an extent of about 9 miles, trends in a southeasterly direction and forms the head of the Gulf of Trieste, presenting a lofty and almost inaccessible shore, where, in three coves there is anchorage for coasters, but no place of refuge for larger vessels. It may be safely approached, as at 200 yards

from the shore the depth is from 5 to 6 fathoms, soft mud. On heights near the sea are the villages of Santa Croce and of Opchina, the latter $1\frac{1}{2}$ miles inland northeastward of Trieste.

The three coves alluded to are those of Duino, Sistiana, and Grignano. Sistiana is exposed to westerly and southwesterly winds, has a depth of about 7 feet, and the holding ground is bad. Grignano, about 5 miles southeastward of Sistiana, affords anchorage in $6\frac{1}{2}$ fathoms, mud, with the castle tower of Mirama bearing 143° 400 yards, but is also exposed to westerly and southwesterly winds. There is a short mole here and water may be obtained from springs in both the two last-named bays.

Telegraph cables.—Miramar Castle, a magnificent building and conspicuous object from all directions, stands on the rocky point forming the southern side of Grignano Bay; the end of the telegraph cable from Trieste to Corfu is landed southward of the point. From the coast the cable trends in a 238° direction for 11 miles and then 233° . Mariners are cautioned not to anchor in its vicinity.

Sistiana Bay—Light.—A fixed green light is exhibited, at 17 feet above high water, from a lamp-post 16 feet high, on the head of the East Mole, visible 1 mile; it is unwatched and unreliable.

Barcola—Light.—A fixed red light is exhibited, at 16 feet above high water, from a green lamp-post, 13 feet high, situated on the head of a small mole at Barcola, visible 4 miles. The light is unwatched and is unreliable in southwesterly gales. Barcola is situated about 1 mile northward of the northern end of the northern breakwater of Trieste Harbor.

The Gulf of Trieste—General remarks—Depths.—The Gulf of Trieste, the northeastern portion or head of the Adriatic, is comprised between Tagliamento Point and Salvore Point, which points bear from each other 298° and 118° and are about $18\frac{1}{2}$ miles apart. From this limit the gulf recedes nearly 20 miles, and at its head or eastern extremity is the city of Trieste. The bottom throughout is of mud and clay, rendering it often difficult to weigh the anchor; the depth in no part, except close to Salvore Point, exceeds 13 fathoms.

In steering for Trieste, vessels should endeavor to make the coast of Istria about Rovigno, the high steeple of which place may be seen at a considerable distance. The long flat on the northern side of the gulf near Grado, including the Mula di Muggia Bank, should not be approached within a depth of 6 fathoms.

Trieste.—This large and important town, containing, according to the census of December 31, 1910, a population of 227,652 and a garrison of 3,052 men, is situated on an acclivity at the foot of a range of hills and mountains; Mount Opchina on the north, being 1,302

feet high; Mount Cal on the east, 1,470 feet; and Mount Bello on the southeast 908 feet; beyond which rise the Julian Alps, with the pass 1,800 feet and the summit 4,000 feet above the sea. The slopes of the hills are covered with white villas, the residences of wealthy merchants, which, being scattered in every direction, present a picturesque appearance from the sea.

The unfavorable and rocky nature of the limestone soil in the neighborhood of Trieste and in Istria, where a large portion of the soil is sandstone, and the want of water, which in dry seasons becomes serious, render cultivation of the land far from profitable. It is best adapted for vine and olive culture, and the country population derive their subsistence chiefly from the produce of the former.

Trieste is well built and rapidly extending, but can not be considered a healthful town, its death rate being ordinarily high; this is attributable partly to the insufficient water supply and to its inferior quality and partly to the quantity of limestone dust generally floating in the air.

The industrial enterprises chiefly deserving notice and affording employment to any considerable extent are the shipbuilding yards and workshops of the Austro-Hungarian Lloyd's Co., usually called their arsenal, and those of Messrs. Strudthoff & Co., called the "Stabilimento Tecnico Triestino"; there are also the engine and boiler factories of Mr. T. Holt and of Messrs. Bartlett and Greenham; also flour mills, a chocolate manufactory, and a brewery.

An excellent chamber of commerce exists, and a school of navigation, to which an observatory is attached. The English church is in the Contrada del Fontanone.

Trade.—The principal imports are coal, coffee, cotton, oranges, dried fruit, wheat, mineral oil, olive oil, valonia, wine, etc.; the exports beer, paper, flour, dried fruit, staves, wine, sugar, etc.

Trieste is a free port but duties are levied by the town on spirits, wine, and fresh meat; and the Government taxes monopolies, tobacco, salt, gunpowder, etc.

Communication.—Trieste is connected by telegraph with all the capitals in Europe; also with Cattaro and Corfu, the latter by Eastern Telegraph Co.'s line. Vessels at Trieste can be connected with the telephone system on shore by application to the harbor master.

A railroad is carried over the Julian and Sømmering Alps, at a summit level of 2,893 feet above the sea, to Vienna in 24 hours, and to Venice, by Udine, in 8 hours. By the completion of the Caravanche railroad (1906) direct communication is established between Trieste and Berlin, the journey occupying 24 hours. The railroad station is alongside the new harbor. Steamers run regularly to the

Black Sea, United Kingdom, North and South America, and to all parts of the world.

Northward of the railroad station is the Lazaretto, one of the largest and best arranged in Europe; it has accommodation for about 200 persons and is surrounded by a wall 24 feet high. Trieste has also an English sailors' reading room and a civil hospital, where foreign seamen are received on payment of a small charge.

Trieste Harbor.—The old harbor is of semicircular form and has sufficient space for a number of vessels of any size. It is sheltered from easterly winds, but exposed to those from the westward; Santa Teresa Mole, which extends northward from St. Andrea Point, protects it from southwesterly winds.

There is a boat harbor on the western side of the mole; it is to be extended, and several buoys will be placed within about 275 yards westward of the mole for mooring boats employed on the work.

The depth at the entrance round the molehead is about 8 fathoms, soft mud; within and to the southward, between it and the Giuseppina Mole, the water is shallow, but there is room for several vessels, and there are four buoys in this part of the harbor for the mooring of torpedo boats.

The southeastern portion is entirely bordered by stone quays with six projecting moles or jetties. Southward of the San Carlo Mole, the northeasternmost of these, is the Mandracchio, a small wet dock, near which is the health office; and northward of this mole is the entrance to the basin, 20 yards wide and 12 feet deep, which extends in a southeasterly direction into the quarter of the new town called Theresien-stadt, by means of which vessels are conveniently unloaded. There are five projecting moles in the southeastern part of the harbor.

The new harbor is northward of the old one, and in front of the railroad station and Lazaretto; it is formed by a substantial quay with four broad projecting piers, sheltered by a breakwater running parallel with the shore and 1,133 yards in length; the space between the piers varies from 267 to 334 yards, and there is about half that space between the pierheads and the breakwater, except at the northern entrance where a short inner transverse arm of the breakwater narrows the passage to 100 yards.

The breakwater is 340 yards from the shore, 197 feet wide at the base, 59 feet at the top, and averages 66 feet in height from base to top. The depth of water within the breakwater and between the piers is from 5 to 8 fathoms.

No berths are reserved in either harbor for naval vessels. Steamers are usually placed alongside the projecting moles or piers, and sailing vessels alongside the quays.

The Bora reaches Trieste with great violence from the high lands in the vicinity, especially in the winter season; in the summer westerly winds, which send in a heavy swell, are the most inconvenient, but they never last long. With strong southerly winds the water sometimes rises sufficiently to inundate parts of the town.

Franz Josef Hafen.—The coast from Santa Teresa Mole to the Petroleum Pier, on the northern side of Muggia Bay, is embanked and forms an extensive line of quayage, from the northern part of which three moles will extend westward; the two northern are completed. Franz Josef Hafen, in which are depths of from 9 to 10 fathoms, lies between these moles and three detached breakwaters. The two northern of these breakwaters are each $\frac{1}{4}$ mile long and the southern 1,600 yards long; they trend north and south and are placed "en echelon" 300 yards apart, the northern breakwater being 400 yards westward of the northern mole, and the southern breakwater $\frac{3}{4}$ mile westward of the southern mole. The two northern breakwaters and a portion of the southern are above water. Vessels passing between these breakwaters must use caution.

Buoys.—There are several mooring buoys in the harbors.

Lights—Old harbor.—A flashing white light is exhibited, at 110 feet above high water, from a gray circular stone tower, 103 feet high, on Santa Teresa Molehead and should be seen from a distance of 16 miles.

Giuseppina Mole.—A fixed green electric light is exhibited, at 19 feet above high water, from a red lamp post, 17 feet high, on the head of Giuseppina Mole, in the old harbor, visible 4 miles; it is unwatched.

New harbor—Breakwater, north end.—Two fixed green electric lights, placed vertically, 19 and 15 feet above high water, are exhibited from a mast over a shed, 13 feet high, on the north end of the detached breakwater, visible 2 miles.

Breakwater—Inner arm.—A fixed red light is exhibited, at 12 feet above high water, from a lamp post, 11 feet high, on the inner arm of the detached breakwater, nearly 200 yards from its northern end, visible 1 mile.

Breakwater, south end.—Two fixed red electric lights, placed vertically, 19 and 15 feet above high water, are exhibited from a mast over a shed, 13 feet high, on the southern end of the detached breakwater, visible 3 miles.

Franz Josef Hafen—No. 5 Mole.—A fixed red light is exhibited, at 22 feet above high water, from an iron candelabrum, 16 feet high, on each corner of No. 5 mole, visible 2 miles. These lights are not lit in northeasterly gales.

North Breakwater.—North end.—A group flashing white light is exhibited, at 25 feet above high water, from a red pillar over a hut,

25 feet high on the northern end of the northern breakwater, visible 9 miles.

Fog signal.—A steam horn, placed in a hut on the northern end of the northern breakwater, gives one long blast followed by four short blasts every 30 seconds.

South end.—Two fixed lights, placed vertically, the upper red, at 31 feet, and the lower white, at 24 feet, above high water, are exhibited from a gray iron support, 36 feet high, on the southern end of the northern breakwater; the red light is visible 5 miles, and the white light 8 miles.

Middle Breakwater—North end.—A fixed green light is exhibited, at 30 feet above high water, from a gray iron structure, 25 feet high, on the north end of the middle breakwater, visible 6 miles.

South end.—A fixed red light is exhibited, at 30 feet above high water, from a gray iron structure on the southern end of the middle breakwater, visible 7 miles.

South Breakwater—South end.—An occulting white light is exhibited, at 30 feet above high water, from a gray pillar, with a platform, over a hut, 25 feet high, visible 10 miles.

The lights exhibited from the breakwaters of Franz Joseph Hafen are unwatched. (See Light List.)

Mooring buoys.—There are several mooring buoys near the jetties (see chart 1434), though generally used by small vessels, their anchors are heavy.

Anchorage.—Large vessels can moor, in about 10 fathoms water, northward of Santa Teresa mole lighthouse and westward of the New Harbor Breakwater.

Regulations.—Steamers entering or leaving Trieste Harbor, when eastward of the line between Santa Teresa Mole and the northern end of the breakwater of the New Harbor, must reduce speed.

Steamers from Muggia, Capo d'Istria, Isola, and Pirano Bays must, when entering Trieste Harbor, pass close to Santa Teresa Mole lighthouse, while those outward bound for these bays must pass not less than 160 yards from the lighthouse.

Directions.—To enter Franz Josef Hafen from the northward pass eastward of the light beacon on the northern end of the northern breakwater, and between the light beacon on the southern end of that breakwater and No. 5 Mole to the eastward.

Tides.—It is high water, full and change, at Trieste at 9h. 30m.; springs rise 2½ feet, neaps 1½ feet.

Radio station.—A radio station is established at Trieste, on Santa Teresa Mole. It is open to the public at all times. The call letters are O. H. T.

Signal station.—There is a signal station at Santa Teresa Lighthouse.

Distress signals.—Vessels within sight of the Santa Teresa Lighthouse, being in distress and unable to communicate by the danger signals of the International Code, should hoist an ensign reversed, or as a waft, by day, or show a white light at short intervals by night.

Docks, quays, etc.—Trieste owes much to the establishment of the Austro-Hungarian Lloyd's Co., whose steamers, upward of 80 in number, communicate regularly with all the principal ports of the Levant, and also, by the Suez Canal, with Hongkong, touching at Bombay, Colombo, and Singapore, with a branch line between Colombo and Calcutta. The arsenal for the repair of their vessels, southward of the town, is in the northern bight of Muggia Bay, at about $\frac{1}{2}$ mile southeastward of St. Andrea Point, it is about 25 acres in extent, and comprises all the departments of a dockyard for building, fitting out, and repairing, is well supplied with workshops and machinery, and is kept in very good order.

It contains a dry dock (Austrian Lloyd's) 446 feet in length on blocks, 68 feet wide at coping, and with a depth of 19 feet over the sill. Parallel to it is Morson's patent slip, with cradle 222 feet in length, 53 feet in width, and a depth of 15 feet on its outer end; it has been used by a vessel 390 feet in length, and is capable of taking up a vessel of 2,100 tons.

The southern face of the arsenal is lined with quays, alongside which steamers can lie, and there are sheers for lifting 80 tons, three cranes, worked by steam, capable of lifting 60 tons each, and a floating crane for raising 30 tons. In the factory is a steam hammer and every requisite for the repair of boilers; some 2,300 men are usually employed on the works.

At the Stabilimento Tecnico, just westward of the arsenal, are a steam factory and foundry where the largest engines are made, and where there are the means for casting a weight of 15 tons. There is also a dry dock (San Rocco) 414 feet in length over all, 66 feet wide at the entrance, and with a depth of 26 feet over the sill. This establishment employs about 1,500 men, and at both of these extensive yards vessels have been built for the Austrian and other navies.

Coal and supplies.—Steamers can be supplied with coal in any quantity at Trieste, there being generally about 4,000 tons in stock. Vessels are usually coaled in the roads, the water being too shallow alongside the coal wharves. An aqueduct constructed on the slope of Mount Santa Croce, 6 miles to the northward, brings water into the town by means of pipes laid along the railroad and carried down to the marina; it is supplied to shipping by the water company, but the quality is indifferent; water can also be obtained from the Govern-

ment tank with permission of the captain of the port. All kinds of provisions, refreshments, and means for refitting vessels are cheap and of good quality.

Time signal.—A staff is fixed to the upper part of the northern side of Santa Teresa mole lighthouse and a black ball, 3 feet in diameter, is hoisted five minutes before the signal, and dropped at noon standard mean time, or 23h. 0m. 0s. Greenwich mean time. Should the signal be inaccurate the ball will be hoisted to, and kept some time halfway up.

A gun is fired at the instant of the dropping of the ball.

Barometer.—A barometer diagram, adjusted from time to time, is on the northeastern side of Santa Teresa mole lighthouse.

Salvage plant.—An additional steamer has been added to the establishment.

Salvage plant.—At Trieste the steamer *Pelagosa*, tender *Audax*, and a lifeboat are available for salvage purposes; there is also a steam pontoon for lifting weights up to 40 tons, and a steam launch with a small steam pump.

Coast—Coast of Istria—General remarks.—The northern and western coasts of Istria commence southward of Trieste and terminate at Cape Promontore, an extent of about 65 miles, forming numerous indentations, among which are some excellent ports, the largest being on the northern coast between Trieste and Salvore Point; the safest are on the western coast, and almost every village may be said to have its little port. The shore between Salvore Point and Cape Promontore is bordered by numerous rocks and shoals, which in places extend more than 2 miles seaward. The soundings near the land vary greatly; between Salvore Point and Rovigno the depth is about 13 fathoms, muddy bottom, outside the rocks; near the shore between Rovigno and Cape Promontore it is frequently 20 fathoms, mud, close to the shore.

Istria is a mountainous peninsula, 27 miles wide from Muggia Bay, near Trieste, to Volosca in the Gulf of Fiume, and about 46 miles in length down its central line to Cape Promontore. It produces oil, wine, wheat, honey, beeswax, silk, hides, tallow, building timber, and salt, and possesses marble and freestone quarries. The climate is considered unhealthful; the population, about 200,000, are chiefly of Slavonic origin in the interior, and Italian near the coasts; their chief occupation is agriculture. The main railroad line, passing eastward of Trieste, forms two branches at Divaca, 10 miles eastward of that city; one passes through St. Peter to the shores of the Gulf of Fiume, the other down the center of the peninsula to its terminus at Pola, with a branch line to Rovigno. The numerous small ports on its coast are nearly all in daily communication by steamer with each other and with Trieste and Fiume.

Anchorage.—There is anchorage all along the coast of Istria, but regard must be had to the direction of the prevailing winds. Generally a vessel may safely anchor during northeasterly and southeasterly winds within a zone of from 3 to 10 miles from the land in good holding ground. With Bora winds, if it can be avoided, a sailing vessel should never anchor between Trieste and Salvore Point, and it is not safe to bring up anywhere with on-shore winds unless there is every indication of fine weather; and then preparations should be made for leaving at any moment.

Muggia Bay, southward of Trieste, lies between St. Andrea and Sottile Points, which are $2\frac{1}{2}$ miles apart. The bay recedes about 3 miles from this line to its head, but is open to northwesterly winds, which send in a considerable sea. Its northern bight is part of the harbor of Trieste, in which is situated Lloyd's Arsenal, before referred to. The bay affords good shelter inside for small craft in a Bora and in easterly winds should they not be able to reach Trieste. There is a depth of 9 fathoms, muddy bottom, $\frac{1}{2}$ mile from the shore, with the steeple of Servola Village bearing 47° . Patches of 5 and $5\frac{1}{2}$ fathoms exist in the northeastern part of the bay, southward of Lloyd's Arsenal.

With westerly winds there is good shelter in a depth of about 8 fathoms abreast the small village of Muggia on the southern side of the bay. Coasting vessels moor within a small mole at this village. There are no hidden dangers in Muggia Bay.

With other than northwesterly winds Zaole Bay, the head of Muggia Bay, apparently affords good anchorage for small craft.

Water may frequently be procured with facility from two streams at the head of Muggia Bay. There is a small run at the village, but in summer it is generally dry.

Telegraph.—At Servola, northern side of Muggia Bay, there is a post and telegraph station with unlimited day service.

Servola—Light.—A fixed green light is exhibited at 18 feet above high water, from a green lamp-post, 16 feet high, on Servola Northwest Molehead, visible 2 miles; it is unwatched.

Harbor lights.—A fixed red light is exhibited at 21 feet above high water, from a lamp-post, 16 feet high, on Muggia East Molehead, visible 3 miles.

A fixed green light is exhibited, at 19 feet above high water, from a lamp-post, 18 feet high, on Muggia Northwest Molehead, visible 2 miles.

The lights are unwatched.

Sabba Light, fixed red, elevated 18 feet above the sea, is exhibited from an iron post at the end of the petroleum pier on the northern side of Zaole Bay, Muggia Bay; it can not be lighted in strong north-east winds. See Light List.

Muggia Port—Regulations for entering.—The following regulations must be observed by vessels using the port:

(a) Five minutes before leaving vessels must hoist a square red flag by day and a red light by night at the highest masthead.

(b) Vessels about to enter, on observing the above signals, must remain outside clear of the entrance until the departing vessel has left.

Coast—Sottile and Grossa Points—San Bartolomeo Bay.—

At the head of the promontory separating Muggia and Capo d'Istria Bays, between Sottile and Grossa Points, is San Bartolomeo Bay, about $\frac{1}{2}$ mile in extent with depths of 6 to 8 fathoms soft mud. The shore of this little bay is protected by high land, under shelter of which vessels of light draft anchor during the Bora and southeasterly gales. There is a mooring buoy in the bay.

On its eastern shore are the extensive buildings of the Lazaretto, and on the hill close by is Fort Olmi, 342 feet above the sea. Both points are bordered by shoal ground, with 4 to 6 feet water, extending about 500 yards offshore.

Buoys.—The shallow water off Sottile Point, the northeastern extremity of the bay, is marked by a can buoy surmounted by a cylindrical topmark. The shoal extending from Grossa Point, the southwestern extremity, is marked by a white beacon buoy in $4\frac{1}{2}$ fathoms.

Light—On Sottile Point from a circular gray tower, 42 feet high, is exhibited, at an elevation of 44 feet above the sea, a fixed white light, visible 11 miles.

Measured Mile.—Two beacons are erected on Sottile Point, and two on Grossa Point, for the purpose of indicating the length of a measured mile. The line of direction is 42° or 222° , with Santa Teresa Lighthouse at Trieste, directly ahead or astern; on this line the depth is 10 fathoms.

San Bartolomeo Bay—Light.—A fixed red light, with a green sector, is exhibited, at 21 feet above high water, from an iron post, 18 feet high, on the northwestern angle of the quay in San Bartolomeo Bay, 450 yards southward of Sottile Point lighthouse; the red light is visible 3 miles, and the green 2 miles.

For the sectors of the light, see Light List and chart, observing that the limits of the green sector just clear the shoals extending from Sottile and Grossa Points. The light is unwatched.

Capo d'Istria—Light.—A fixed red light is exhibited at 14 feet above high water, from a green lamp-post, 13 feet high, on the head of the boat harbor mole, on the northern side of the town, visible 2 miles; the light is unwatched.

Capo d'Istria Bay, between Grossa and Ronco Points, is open to the westward; these points are about $4\frac{1}{2}$ miles apart, and the bay

recedes about 3 miles. The general depth of water is from 10 to 11 fathoms all over the bay, except close inshore; at the head in Stagnon Campi Bays, the water is shallow, and the bottom soft yellow mud, as it is in the greater part of the bay. High lands rise close to the shore, the highest peaks forming Mount Trajan.

The usual anchorage is in 10 fathoms, mud, $1\frac{1}{4}$ miles northwestward of the town, sheltered from off-shore winds but exposed to those from the westward, which occasion a heavy and sometimes dangerous sea. The holding ground is not good.

Harbor light.—On the head of the Galere Mole at Capo d'Istria, a fixed green electric light is shown from a green iron column, at an elevation of 17 feet above the sea, visible about 3 miles.

The town of Capo d'Istria has an imposing appearance from seaward. It stands on a rocky islet a short distance from the shore and communicates with the mainland by a stone causeway. It is the chief city of the Istrian Peninsula and has a population of about 8,250, but is of less importance than formerly, owing to the proximity of Trieste, to the absence of a safe port, and to the fact of Pola having become the great naval port and arsenal of Austria. The climate is healthful, notwithstanding the close vicinity of numerous salt ponds. A short mole and the coves under the town afford shelter to small coasters and fishing boats, which also seek refuge from a gale in Stagnon Bay, eastward of the town, between it and the mouth of the rivulet Risano.

Supplies.—An aqueduct conveys a good supply of water to the seaside at La Colonne, from whence it is led into the town by mains laid under water. Provisions of all kinds are obtainable. The only other resources are those suitable to the construction and refitting of small native craft.

Vilisan Point—Buoy.—Off Vilisan Point, 3 miles westward of Capo d'Istria, a buoy is moored in about 2 fathoms water near the edge of the shore bank.

Isola.—Point Isola is a small rocky projection with a village of the same name on it 3 miles westward of Capo d'Istria and joined to the main by a low narrow strip of land. A cove, protected by a mole, has sufficient space to shelter about 100 fishing boats.

Vessels may anchor about $\frac{1}{2}$ mile westward of Isola in a depth of 9 fathoms, mud. Water in abundance may be obtained from a spring southward of Isola.

Harbor lights.—A fixed red light is exhibited at 19 feet above high water, from a green lamp-post, 15 feet high, on San Pietro Rock, Gallo Point; visible 3 miles.

A fixed green light is exhibited at 16 feet above high water, from a lamp-post 15 feet high, on Isola Molehead, visible 1 mile; it is unreliable in northeasterly gales. The lights are unwatched.

Port Rose.—There is a telephone station here.

Lights.—A fixed red light is exhibited at 33 feet above high water, from a house 10 feet high on the bastion of a fort on Madonna Point; visible 8 miles.

(For the arc of visibility, see Light List.)

A fixed green light is exhibited, at 18 feet above high water, from a green lamp-post, 17 feet high, on Pirano northern molehead; visible 2 miles; it is unwatched.

A fixed red light is exhibited, at 15 feet above high water, from a green lamp-post, 16 feet high, on Pirano southern molehead; visible 3 miles; it is unwatched.

White lights are occasionally shown on and near the inner ends of the moles at Pirano.

Ronco Point, at the western extremity of Capo d'Istria Bay, is a high cliffy point of brownish color. Like the rest of the coast for a distance of 2 miles southwest of Madonna Point, on which stands the town of Pirano, it is of bold approach.

Pirano Bay, situated between Madonna Point and Salvore Point at 3 miles west-southwestward of it, although unprotected from the Bora, affords the best anchorage on the coast of Istria for sailing vessels unable to reach Trieste, or which, being driven by strong winds from that port, are obliged to bear up for shelter.

The bay is surrounded by high land and large vessels may anchor anywhere in depths of from 7 to 9 fathoms, soft mud, but the holding ground is bad, which renders this place dangerous in a Bora. With this wind, the anchorage under Mount Mogarone, $\frac{3}{4}$ mile southward of Madonna Point, between Pirano and Port Rose, is the least insecure; here there is a depth of 8 or 9 fathoms, mud; if possible, however, vessels should avoid riding out a Bora here, for if driven from their anchors they would be unable to gain an offing and would have the iron-bound coast terminating in Salvore Point as a lee shore.

Northerly and northwesterly winds, to which Pirano Bay is open, are seldom strong enough to cause a vessel to drag, and at the worst she would be only forced on the mud at the head of the bay. Westerly winds send in a considerable but not a dangerous sea.

Port Pirano is a small inlet well protected westward by a mole; it has a depth of 2 fathoms; around it is the town which, with its environs, contains a population of about 7,500, who share with Rovigno nearly the whole commerce of this coast. The steeple of St. Giorgio being 236 feet above the sea, may be seen at a considerable distance. On the shore, at the head of the bay, are several salt ponds. Water and provisions may be procured.

Coal.—A small supply of native coal may be obtained at Pirano, about 300 to 500 tons being usually in stock; larger quantities can be supplied if notice be given.

Port Rose.—This small port under Mount Mogarone, 1 mile southward of Pirano, affords shelter to small craft. The convent of St. Bernardino, on the left of the entrance, points out its position.

A flashing green light is exhibited, at 27 feet above high water, from a red iron tower, 26 feet high, on San Bernardino point mole-head, Port Rose; visible 4 miles, and is unwatched.

Salvore Point, at 3 miles west-southwestward of Madonna Point, is the northwestern extremity of the Istrian Peninsula, and presents a front in that direction nearly $1\frac{1}{2}$ miles in extent. It is low, of dark appearance, and broken into three distinct projections with small bays between them; it is dangerous in foggy weather, although there is a depth of 11 fathoms about 600 yards from it. Vessels sometimes lie almost in a calm under the land of Salvore when the heaviest Bora is blowing in the Gulf of Trieste.

Light.—On the low southwestern extremity of the land forming Salvore Point, is a white circular tower, with a green lantern, 95 feet in height, from which is exhibited at an elevation of 120 feet above the sea, a fixed and flashing white light. The light is visible 17 miles. As this light is seen from Grado in clear weather, it is useful to the navigation of the whole Gulf of Trieste.

Fog signal.—A steam fog horn given one blast every 21 seconds; blast, 6 seconds. (See Light List.)

Signal station.—An electric telegraph station is established near the lighthouse, with which vessels can communicate by the International Code of signals.

Dangers.—There are several rocky heads fronting Salvore, at the distance of from $\frac{1}{2}$ mile to 1 mile from the shore, which should be avoided by vessels of deep draft.

From the For Shoal, the outer danger with $4\frac{1}{2}$ fathoms water, Salvore lighthouse bears 148° , distant 1.1 miles, and the northern extremity of Salvore Point 93° .

Gobbo (Humpback), a rocky shoal at a depth of $3\frac{1}{2}$ fathoms, lies $\frac{1}{2}$ mile from the shore, with Salvore lighthouse bearing 173° , distant 1,400 yards, and the northern extremity of Salvore Point 68° .

The Or Shoal, with 4 fathoms, is southwestward of the Gobbo, the lighthouse bearing 126° , distant 1,200 yards.

The Skar, also with 4 fathoms, and the southernmost of these dangers, is about 400 yards in length; and, from its northern end, Salvore Lighthouse bears 50° , distant 1,600 yards. The bottom in the vicinity of the lighthouse is uneven and the soundings irregular.

The coast from Salvore Lighthouse to Umago, $3\frac{1}{2}$ miles to the southward, is of little height; it has several bays, with depths of 2 to $3\frac{1}{2}$ fathoms, in which coasting vessels seek temporary refuge from the Bora.

Scipar Shoal is a rocky bank about $1\frac{1}{4}$ miles southward of Salvore Lighthouse, of which parts are at times uncovered; it extends a long $\frac{1}{2}$ mile southwestward from the shore and is abreast a small church and a few houses near the beach.

Buoy.—A white conical buoy surmounted by a tripod and ball, in 19 feet water, marks the outer edge of the Scipar Shoal; from it Salvore Lighthouse bears 351° and the ruins of Scipar Castle 92° . This buoy is liable to break adrift.

Port Umago is a small semicircular bay open to the westward; the entrance is reduced to a width of about 150 yards by rocks extending toward each other from the extremities of the port.

A mole with a slight outward curve is built on the spit which projects 400 yards in a 323° direction from the village on the southern side of the bay, having a red lighthouse at its head.

About 9 feet water may be carried through the entrance of the bay and the depth increases inside at the anchorage to $2\frac{1}{2}$ fathoms, mud and sand, with the church steeple, which is 109 feet above the sea, bearing about 173° and the lighthouse 261° . The space available for anchorage is nearly 600 yards wide in each direction, and this anchorage is preferred to that of Pirano by small craft, as it is better sheltered from the Bora. The entrance channel is being dredged to the depth of 16 feet.

Directions—Beacons.—On the northern side of the entrance to the port is the light structure or beacon westward of Pegolotta Point, in about 3 feet water, marking the shoal which extends 400 yards to its 3-fathom edge; and southward of that point, marking the northern side of entrance to the port, is a beacon having a stone foundation and wooden superstructure. This latter beacon stands in 6 feet water, just southward of a 4-foot patch.

Vessels entering the port should pass between the beacon and the molehead, but nearest the latter, and leaving on the starboard hand the nun buoy surmounted by a skeleton ball in $8\frac{1}{2}$ feet water marking the edge of the shoal extending along the side of the mole.

There is temporary anchorage off the port about $\frac{1}{2}$ mile southwestward of the lighthouse in a depth of about 10 fathoms. Care is necessary when entering the port from the northward not to approach Pegolotta Point too closely on account of the reef before referred to.

Lights—Pegolotta Point.—From a conical beacon on iron frame, 38 feet in height, about 400 yards westward of Pegolotta Point in about 3 feet water, a fixed white light (unwatched) with red sector is exhibited at an elevation of 35 feet above the sea. The light is visible 8 miles.

From a turret above a red dwelling on Umago Molehead is exhibited at an elevation of 29 feet above the sea a fixed green unwatched light, visible at 2 miles.

A fixed white lantern light, with red sector (unwatched), is also exhibited from a post 19 feet above the sea, at the head of a small pier, inside the port, visible 2 miles. (For limits of sectors see Light List of Charts.)

The village, containing a population of about 2,800, stands on the southern side of the entrance and may be readily seen from some distance.

Lifeboat.—A lifeboat is stationed at Umago.

The coast from Umago to Quieto, 8 miles to the southward, is clear of outlying danger, with depths of from 8 to 10 fathoms about 800 yards from the shore; it is low and there are several small bays within this space.

Port Daila, the principal of these bays, affords shelter to coasting vessels from easterly winds, in a depth of about 4 fathoms, muddy bottom. A castle and some houses indicate the position of Daila, which is about $4\frac{1}{2}$ miles from Umago.

The post office at Daila is connected by public telephone stations with the State telephone system.

Light.—A fixed red light is exhibited at 19 feet above high water, from a lantern on a green lamp-post, 17 feet high, on Daila Molehead, visible 3 miles; the light is unwatched.

Buoys.—A rocky bank, parts of which uncover with the tide, extends in a northwesterly direction about 700 yards from the southern point of Daila Bay. A white cone buoy with skeleton ball marks the northern side of this shoal in 16 feet water.

There is a mooring buoy in $3\frac{1}{4}$ fathoms water, lying 933 yards 25° from Daila Tower.

A stranger entering this bay from the southward, should pass westward of the white buoy in a depth of 8 or 9 fathoms, and enter nearly midway between the north and south points, with the Sanitat, on a rocky point at the head of the bay, bearing about 104° .

Ports Quieto and Cittanuova.—**Cittanuova** is situated about $2\frac{1}{2}$ miles southward of Port Daila; the town stands on the projecting point which separates the ports of Cittanuova and Quieto; it contains a population of about 2,000, many of whom are fishermen.

The port is on the northern side of the town and open to the westward; and, being bordered by shoal water, has but a small space for anchorage about 600 yards in length by 200 in breadth, with a depth of 3 to 5 fathoms, soft mud. It is partially sheltered from southwesterly winds by the Val Shoal which lies off the entrance. Piles are driven into the shore, to which small craft secure their cables during Bora winds.

Cittanuova.—The post and telegraph office at Cittanuova is connected by public telephone stations with the State telephone system.

Lights.—An occulting light, with white and red sectors, is exhibited, at 22 feet above high water, from a red iron pillar, 20 feet high, on the northwestern end of Cittanuova Quay; the white light is visible 7 miles and the red light 4 miles; the light is unwatched.

For the limits of the sectors of the light, see Light List and chart.

The white sector of the light leads between Val Shoal and the $2\frac{3}{4}$ -fathom extremity of the shoal water extending from Carpignan Point.

A fixed green light is exhibited, at 17 feet above high water, from a lamp-post, 15 feet high, on the head of the pier at the boat harbor at Cittanuova; it is unwatched. (See Light List.)

Telegraph cable.—The telegraph cable from Port Grado is landed here.

Lifeboat.—A lifeboat is stationed at Port Cittanuova.

Beacon.—About 134 yards westward of Vescovo Point, there is a beacon, in 8 feet water marking the shallow edge of the shoal, consisting of an iron post surmounted by two discs set at right angles.

The Val Shoal, on the northern side of entrance to Port Quietto, within a depth of 5 fathoms, is nearly 800 yards in extent, with a least depth of $2\frac{1}{4}$ fathoms on its central part, situated 1,050 yards 255° from a battery at Cittanuova. It has been reported (1904) that the depth on the shoal is less than that charted. Between the shoal and the town, there is a depth in the center of $5\frac{1}{2}$ fathoms, mud and shells. The light on Dente Point on the southern side of the entrance to Port Quietto is obscured over the shoal.

Buoy.—A white buoy, surmounted by a cage, in 13 feet water, is moored near the center of the Val Shoal; it is liable to break adrift.

Quietto Bank, about 200 yards in extent, with a depth of $4\frac{3}{4}$ fathoms over a rocky bottom, is situated eastward of Val Shoal, with its center 650 yards 160° from the beacon off Vescovo Point.

Directions.—In approaching Port Cittanuova, the northern extremity of the town should not be brought northward of 81° , and a course should be steered midway between the northern point of entrance and the town, as both shores, being bordered by shoal water, must be avoided.

At night, keep in the white sector of Port Cittanuova Light when in the obscured sector of Dente Point Light, to avoid Val Shoal.

Port Quietto derives its name from the small Quietto River, which has its source in the interior of Istria, traverses Montona forest, celebrated for its curved or knee timber, and empties itself into this bay. Port Quietto is open to the westward, with depths of 11 or 12 fathoms at the entrance, shoaling to 5 fathoms, soft mud, at about 1 mile within Dente Point; the soundings decrease gradually towards the eastern shore, which is composed of marshy ground communicating with the mouth of the river.

Port Quieto affords good anchorage for vessels of any size, being sheltered from all but westerly winds; these send in a considerable sea, which, however, is never dangerous, and a vessel parting from her anchors would be driven on soft mud at the head of the bay. The Bora never blows as hard here as at Pirano, and its direction is not such as to prevent egress, if it should be desirable to quit.

The best berth is in the middle of the bay, in 8 to 10 fathoms; or, off Dente Bay in about 10 fathoms, $\frac{1}{4}$ mile from the shore.

The head of the narrow creek named Valditorre Bay, in 10 feet water at the eastern extremity of the bay, affords security to small craft which anchor and make fast to the shore.

At Quieto, Venetian naval vessels formerly landed or shipped their guns and heavy stores when the weather did not permit of their lying safely at Peloroso Road.

Mooring buoy.—A mooring buoy lies in $5\frac{1}{2}$ fathoms water about 250 yards southwestward of San Pietro Point.

Supplies.—Excellent water may be procured in abundance at a spring close to the sea, half way between Bernazza Point and the head of Valditorre Bay. Oil, wine, firewood, and other small supplies may be procured from Cittanuova.

Light.—On Dente Point, the southern point of entrance to Port Quieto, is a light-tower on the angle of a dwelling, from which is exhibited at an elevation of 36 feet above the sea, a fixed white light, visible 11 miles. The light is obscured in the direction of Val Shoal; by avoiding the obscured sector, the shoal is cleared on either side. It is also obscured to clear the Civran and other shoals to the southward. (For limits of obscured sectors see Light List and chart.)

Directions.—On approaching Port Quieto from the southward, the shore should be avoided and the lighthouse on Dente Point kept eastward of 19° bearing, in order to clear the Civran Shoal, which is 1.7 miles southward of the lighthouse and lies off the southern side of Port Cervera. On approaching from the northward, the northern extremity of Cittanuova should not be brought northward of 81° , until Dente Lighthouse bears 123° in order to avoid Val Shoal, marked by a white buoy.

Care must be taken, however, to give Val Shoal a safe berth of 400 yards southward (see chart), before hauling into the obscured sector.

Coast—Port Cervera, between Dente and Saltarel Points, the latter 1.4 miles to the southward, is about $\frac{3}{4}$ mile in extent, with depths of 8 to 10 fathoms, soft mud, at its head, where there is anchorage for small vessels, sheltered from all but north-westerly winds. The southwestern side of the entrance is obstructed by shallow rocky ground which protects it from that quarter. In enter-

ing the port, the southern point should be given a wide berth, and the northern shore be kept aboard.

The village is on rather high land on the southern side, and near it is a small stream.

Civran Shoal.—The shallow rocky ground off Saltarel Point, on the southern side of the entrance to Port Cervera, extends 1,200 yards northwestward of the point and then trends nearly 1 mile in a southwesterly direction at about 1,600 yards from the shore. The northwestern portion is named the Erbe Shoal, and on it is a rock which uncovers 2 feet; the southern and larger portion is the Civran Shoal, which also has a rock above water in the middle of it at about $\frac{1}{2}$ mile westward of the point.

Buoy.—A white buoy with staff and skeleton ball, in a depth of $4\frac{1}{4}$ fathoms, marks the southwest extremity of Civran Shoal. It lies 1 mile 247° from Saltarel Point.

Castagneda Point northward of Cittanuova, bearing eastward of a 351° , leads westward of the shoal; also Dente Point Lighthouse eastward of a 13° bearing, and the light in sight at night.

Between Civran Shoal and Maturaga Point, $1\frac{1}{4}$ miles southward of it, the coast is low and has one or two small bays, with depths of 2 to 3 fathoms, sandy bottom, open to the westward.

Ambolizza Shoal, with a depth of 8 feet on it and deep water close to, lies about 1,000 yards from Maturaga Point and $1\frac{1}{4}$ miles 354° from the tower on San Nicolo Islet. To avoid this danger, keep the tower well eastward of 170° .

Beacon.—Ambolizza Shoal is marked by an iron staff 21 feet high, surmounted by two disks set at right angles to each other.

At night, the fixed red light on Barbaran Island in sight clears the Ambolizza and Civran Shoals, as also does the light on Dente Point.

Parenzo.—This small and ancient town, containing a population of about 3,500, stands on a low tongue of land about $4\frac{1}{2}$ miles southward of Queto; it has a large church, a basilica of the time of Justinian (A. D. 540), one of the oldest Christian churches existing, and an old convent, near which is a conspicuous round tower. The town is scantily supplied with water by cisterns and wells. Wine and salt fish are procurable. It has daily communication by steamer with Pola and Trieste.

The port of Parenzo is formed by the town and Barbaran Islet on its northeastern side, and by the islets of San Nicolo, Calbula, and Sarafel, on its southwestern side, the whole group of islets and shallow water extending northwestward 1,400 yards from the shore. The area of the anchorage ground is 800 yards in length and about 400 yards in breadth, with depths of from 2 to 5 fathoms, hard mud and good holding ground.

For vessels drawing not more than 15 feet, this port affords the best shelter to be found on the coast of Istria, but for larger vessels it is only safe with land winds.

San Nicolo Islet, 80 feet high and 600 yards in length, is connected by a shallow flat with the low islet of Calbula 100 yards north-westward of it; this flat extends from Calbula to the distance of 300 yards and continues along the eastern shore of San Nicolo nearly at the distance of 200 yards.

Buoy.—A buoy marks the northeastern extremity of this flat, within which is a patch with less than 6 feet.

Boat passage.—There is a passage 30 yards wide, with a least depth of $2\frac{1}{2}$ fathoms, for the convenience of small craft, between the small breakwater extending from San Nicolo and Sarafel Island southeastward of it.

Quarantine is performed on the islet; it is planted with olive trees, and on it is a convent and an ancient tower.

Note: Owing to works in progress for reconstructing the breakwaters extending from San Nicolo Island and Sarafel Islet, the above passage is closed until further notice.

Beccaria Shoal, with 6 feet water, lies 600 yards southward of San Nicolo Islet, with the tower bearing 5° ; it is marked by an iron staff 8 feet high, surmounted by a cage.

Barbaran Islet lies about 250 yards northwestward of the town, and between is a $2\frac{1}{2}$ -fathom channel; the current sometimes runs strong through this pass and sets toward the shoal fronting the town.

Lights.—A fixed red light (unwatched), elevated 30 feet above high water, and visible 5 miles, is exhibited from a small iron tower on a stone base, in the center of Barbaran Islet. (For obscured sectors see Light List.)

On the head of a small mole projecting southward from the central part of the town, a fixed green light (unwatched) is shown, visible 3 miles.

Coal.—A small supply of coal may sometimes be obtained at Parenzo.

Tides.—It is high water, full and change, at Parenzo, at 9h. 20m.; the rise is about 2 feet.

Directions.—The best and most direct channel by which to enter Port Parenzo is that between Barbaran and Calbula Islets; it is about 200 yards wide, has a depth of 6 fathoms, and a 134° course leads directly up to the inner part of the anchorage. In order to keep well clear of the shoal water, marked by a buoy, off the northern extremity of San Nicolo, the Barbaran side of mid-channel should be preserved.

The convent of San Nicolo, the old tower on the northwestern part of the islet, the gasometer 700 yards northeastward of Parenzo, and the town itself sufficiently indicate the position of the port.

The coast between Parenzo and the Canale di Leme, 6 miles farther southward, is irregular, becomes rather higher, and is indented by several bays; but, with the exception of Fontane and Orsera Bays, they only afford shelter to boats or very small vessels with offshore winds. The shore is bordered by islets, rocks, and shoals, which at one part extend more than $1\frac{1}{2}$ miles seaward, and vessels should avoid closing this part of the coast. At night the light on Dente Point should be kept in sight, and in the daytime eastward of a 13° bearing.

Port Fontane, about $2\frac{1}{2}$ miles southward of San Nicolo Islet, is about $\frac{3}{4}$ mile deep; 900 yards wide at its entrance between Bassolini Point, to the north, and Rovera Island, on the south, and open to the westward. Its shores are surrounded by rocks and shallow water, extending between 600 and 800 yards from the head of the bay to a depth of 2 fathoms. Nearly in the center is a rocky patch with $2\frac{1}{2}$ fathoms; elsewhere the depths are from $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms, mud.

Shoals—Beacons.—In the approach to the bay, between San Brigida Islet on the north, and Rovera Island, 58 feet high, on the south, and, nearly equidistant between these islets, there are several shoal patches upon which the sea breaks. The outermost patch, with a depth of $3\frac{1}{2}$ fathoms, lies $\frac{3}{4}$ mile 289° from the western point of Rovera Island. Shallow water extends 400 yards westward of Rovera.

Benvegnuta Shoal, at 750 yards 269° from Bassolini Point, is marked by a beacon. There is a shoal with 4 fathoms between it and the outer shoal above mentioned.

On the western edge of a rock northward of Fontane Point, there is an iron pole, 22 feet high, surmounted by an openwork ball, painted white; there is no passage between this beacon and the point.

Reverol Shoal is a rocky patch lying 400 yards 277° from Reverol Islet on the southern side of approach to Port Fontane.

The anchorage, for small craft only, is in about 4 fathoms, mud, at 300 yards from the southern shore of the bay, sheltered from all but westerly winds. Fontane village and chapel, on the southern side at the head of the bay, indicate the position of this anchorage.

To avoid the shoals at the entrance steer in with Rovera Islet bearing 92° until within $\frac{1}{2}$ mile of it; then steer northeastward toward Bassolini Point, give the islet a good berth, and round it for the anchorage.

Port Orsera Approach—Marmi Grande Shoal.—Of the numerous islets, rocks, and shoals fronting the coast between Rovera Island and the Canale di Leme, the outer danger, the Marmi Grande,

is 400 yards in length and has 2 fathoms least water, with Marmi Shoal lighthouse bearing 154° nearly 1,200 yards.

A buoy, surmounted by a tripod and bell, is moored off the north-western edge of Marmi Grande Shoal.

Marmi Shoal, situated $\frac{1}{2}$ mile southward of Marmi Grande Shoal, is more than 200 yards in extent. The lighthouse makes it a valuable guide to the position of other shoals in the neighborhood.

Between Marmi Shoal and Marmi Grande is the Marmi di Mezzo, with 2 fathoms water. The Campanile, with $3\frac{1}{2}$ fathoms, and other dangers lie nearer the coast. Small craft find their way among the several islets and dangers, but large vessels should give all this part of the coast a wide berth.

Light.—A flashing red light is exhibited, at 31 feet above high water, from a red conical iron turret on a masonry base, 31 feet high, on Marmi Shoal, visible 6 miles; it is unwatched.

Piova Bay—Mooring buoy.—A mooring buoy is placed in Piova Bay; it is private property, and used for mooring vessels taking stone from the local quarry.

Port Orsera—Light.—The white light should be seen from a distance of 3 miles, and the green light of 1 mile; the light is unwatched.

Sasso Reef, situated 800 yards southeastward of Marmi Shoal, has on it an iron staff, surmounted by a cage painted white. There is a narrow passage between this reef and the western extremity of Lunga Island, with a depth of 4 fathoms.

Port Orsera, about 2 miles south of Port Fontane, is a narrow inlet $\frac{1}{2}$ mile deep, the inner end being very shallow; the outer part, sheltered by San Giorgio Island on the southwest, affords anchorage for coasters in a depth of $3\frac{1}{2}$ or 4 fathoms, mud. The port is open to northwesterly winds, but is partly sheltered by Galiner Islet and a shoal extending southward from it, fronting the entrance. Here is found the beautiful white limestone formerly quarried in large masses, and used in the buildings of Venice.

Light.—On the head of the landing pier in Port Orsera a fixed white light with green sector is exhibited from an iron support, at an elevation of 18 feet above the sea. This light is visible 2 miles. (For limits of sector see Light List and chart.)

Directions.—Vessels bound to this port should pass northward of San Giorgio Island and between it and Galiner Islet, near the middle of the entrance, avoiding the shoal extending southward from the latter. Orsera Castle, on a hill on the northeastern side of the bay, is a good mark for the port, and when on with Galiner Islet, bearing 106° , leads northward of the Marmi Grande Shoal.

Mooring buoys.—There are 15 mooring buoys in two lines on the eastern side of Fasana Channel northward of Fasana Village. The

outer row of buoys are at an average distance of 330 yards from each other, inner row 270 yards from one another. They extend in a northerly direction from abreast of Fasana Village.

Lights.—A flashing white light, with a red sector, is exhibited from a concrete beacon about 200 yards east-northeastward of Saluga Point, visible 8 miles; it is unwatched. (For the red sector of the light see Light List and chart.)

Fasana Harbor.—The small harbor of Fasana is formed by two moles, inclosing an area with a depth of about 6 feet.

The shores in the vicinity of Fasana are generally low, well wooded, and cultivated. Dignano Village, $2\frac{1}{2}$ miles inland and on a hill 423 feet high, the clock tower of which is visible at a considerable distance, helps to point out the position; it bears 47° of Fasana.

Lights—Fasana.—Two fixed red lights, vertical, elevated, respectively, 42 and 59 feet above the sea, and appearing as one light over a distance of 4 miles, are exhibited from the steeple of the church of Fasana. They are visible at the distance of 10 miles.

From an iron framework at the extremity of the northern mole, at 21 feet above the sea, is shown a fixed green light, visible 1 mile.

From an iron post on the southern molehead a fixed red light, elevated 19 feet above the sea, is shown, visible 2 miles.

(For arc of visibility see Light List.)

Telegraph.—There is a telegraph station at Fasana.

Cosada Shoal.—At the southern end of the Fasana Channel are the two islets, Girolamo and Cosada, having a narrow $4\frac{1}{2}$ -fathom passage between them. About 700 yards northward of Cosada Islet is Cosada Shoal, about 400 yards in extent, with $2\frac{1}{4}$ fathoms least water. Fort Musil, just over Cristo Point bearing 173° , leads westward of the shoal and in the deepest water between the two islets.

Buoys.—The east coast of Scoglio Grande is bordered by shallow water, and its edge off Rancon Point is marked by a white conical buoy, surmounted by two cones, bases together, the upper red and the lower white.

A white conical buoy, surmounted by two cones, points together, the upper white and the lower black, is moored in $4\frac{1}{4}$ fathoms on the southwestern side of Cosada Shoal.

Floating beacons.—The eastern coast of Scoglio Grande is bordered by shallow water, and its edge at Rancon Point is marked by a truncated pyramid beacon 8 feet high and four-sided, each side painted half white and half red vertically, with the words "ten meters" in black ($5\frac{1}{2}$ fathoms), the depth of water in which the beacon is moored. A similar beacon, in $4\frac{1}{4}$ fathoms, marks the western edge of the Cosada Shoal.

Directions.—Vessels passing northward of the Brioni Islands on the way to Fasana, round Cabula Shoal Lighthouse at a prudent distance. Porer Shoal, on the northern side of approach, with the clearing mark southward of it, has been described. There are no other dangers worth mentioning here.

Anchorage may be taken off Fasana in any required depth. See mooring buoys, above.

Proceedings through Fasana Channel.—The channel between the Cosada Shoal and that extending from the Brioni Island, between the depths of 5 fathoms on either side, is only 250 yards wide, and carries from 6 to 11 fathoms. After passing between the white conical buoys surmounted by two cone topmarks, with Girolamo Range Lights in range bearing 187° , vessels may, if preferred, keep westward of Girolamo (northwestern point marked by green light at night), the channel between it and Scoglio Grande being perfectly clear; with the flood tide and a northwesterly breeze there is a strong southerly stream through this passage, sometimes amounting to 3 or 4 knots.

Lights—Cabula Shoal.—A fixed white light (unwatched), elevated 21 feet above the sea, is exhibited from an iron framework 26 feet high, on Cabula Shoal at the northwestern extremity of the group, visible 8 miles. (Unreliable.)

Peneda (Pedena) Point.—A fixed white and flashing light is exhibited, at 65 feet above high water, from a white square tower, 49 feet high, in the front part of a white dwelling, 40 yards inland from Peneda Point, visible 14 miles. (For the arc of visibility of the light see Light List and chart.)

Several electric lights, one of which is shown from a high pole, are exhibited near the lighthouse.

Girolamo—Range lights.—In Fasana Channel, between the Brioni Islands and the mainland, from an iron framework on the north side of Girolamo Island, a fixed red light, elevated 15 feet above the sea, is exhibited, visible 3 miles.

At 211 yards 187° from the above another fixed red light, elevated 35 feet above the sea, is exhibited from an iron crane, also visible 3 miles.

These lights in range, bearing 187° , lead in mid-channel between Rancon Point Shoal and Cosada Shoal.

On the northwestern point of Girolamo two fixed green lights, placed vertically 24 feet and 30 feet above the sea, are exhibited from an iron crane; they are visible at 2 miles.

(For arc of visibility see Light List.)

Anchorage.—In case of necessity during a bora a vessel may anchor $1\frac{1}{2}$ miles westward of Vanga Islet, western side of Brioni Island, in a depth of about 20 fathoms. Also about $\frac{3}{4}$ mile south-

westward of Cape Compare at the entrance to Pola, in 22 fathoms, with Cape Compare Lighthouse bearing about 41° . At both anchorages vessels are exposed to westerly and southerly winds.

Telegraph.—There is a telegraph and telephone station at Brioni.

Canal di Fasana (Fasana Channel) is between the Brioni Islands and the coast. In its northern portion a considerable number of vessels of any size may find shelter from all winds but those from northwestward, in which direction the channel is open; the southern portion, although of sufficient depth, consists of a bed of rocks uniting the Brioni Islands with the coast and is bad holding ground.

Large vessels should anchor in about 9 fathoms, mud and shells, with the eastern extremity of Scoglio Grande bearing about 179° and Fasana village 114° . Small craft generally anchor at a short distance from the village with it bearing about 131° . A great quantity of fish may be caught here.

Rocky ground.—From about 1.2 miles west-northwestward of Fasana Church a patch of rocky ground extends 600 yards southward, with a breadth of about 400 yards.

Submarine mining ground.—This practice ground extends for about 1 mile from Femmina Point (Scoglio Minor Island) in the direction of Barbariga Point, the limits being marked during practice by four boats each flying a red flag and exhibiting two fixed red lights at night vertically placed. This area must not be entered by vessels or boats.

Barbariga—Light.—A fixed green light is exhibited, at 10 feet above high water, from an iron lamp-post, 10 feet high, on Barbariga Molehead, visible 2 miles. The light is unwatched.

A sunken rock lies about 300 yards 328° of the islet.

St. Andrea, the largest of the group northward of San Giovanni di Pelago, 62 feet high, and nearly divided into two by a low neck in the center, is covered with wood and has a monastery on its northern part; shallow water extends a short distance westward from this islet.

Porer Shoal has $4\frac{1}{2}$ fathoms water over it and is the outer danger off this part of the coast. It is steep-to, with depths of 10 to 18 fathoms close around, and lies $1\frac{1}{2}$ miles from the coast, with Porer Islet bearing 72° 1.2 miles and San Giovanni di Pelaga Lighthouse 320° $4\frac{1}{2}$ miles.

Diagnano Church tower in range with the Red limekiln on the eastern shore of Fasana Channel, bearing 101° , leads southward of the Porer Shoal.

Brioni Islands.—The northern extremity of these islands lies 8 miles southeastward of San Giovanni di Pelago Light; they lie nearly parallel with the coast and are separated from it by the

Fasana Channel. The islands are of marble, ranging from about 50 to 100 feet in height, and are covered with fine underwood and aromatic shrubs; their shores are irregular and broken by many little bays and inlets. Numerous islets, rocks, and shoals lie on their western and northern sides, and the whole together occupy a space about 4 miles in length by 2 miles in breadth.

The two principal islands are Scoglio Grande and Scoglio Minor. The highest point is about the center of Scoglio Grande, the southern island; on it stands Fort Tegetthof, and the little village of Brioni is in the small bay northeastward of the fort. Scoglio Minor, the northern island, has a bay on its southern side, in which coasting vessels anchor in about 4 fathoms, muddy bottom, and are well sheltered by Scoglio Grande.

Northwestward of Scoglio Minor is a group of five islets surrounded by shoals, and nearly connected with the island by reefs. About 1,200 yards outside or westward of these islets and extending 1.2 miles from Scoglio Minor are four shoals, of which the Cabula, the most northern, is awash; the others are covered with from 2 to 3 fathoms water.

Southward of the northern islets is another group of five islets a short distance westward of Scoglio Grande and sheltering an indentation in that island named Madonna Bay.

There is a 4-fathom channel into the bay northward of Gallia, the northern islet; a 10-fathom channel between Orsera, the southern islet, and the shore of Scoglio Grande; and a $5\frac{1}{2}$ -fathom channel between Orsera and Vanga Island, the next islet to the northwestward. Half a mile 317° from the western end of Gronghera, the western islet of the southern group, is the shoal of the same name with 3 fathoms water.

Small vessels may safely anchor in Madonna Bay in 4 to 5 fathoms; Joper Shoal, in its northern entrance channel, is marked by a perch beacon. The largest of the five islets and the only one wooded is Vanga. For further details, see the chart.

Sassi Bank, with $3\frac{1}{2}$ fathoms, lies nearly 400 yards westward of Santa Caterina Island. Bagnole Islet, which is steep-to, lies about 1,200 yards westward of Santa Caterina.

Lights.—A fixed green light is exhibited, at 23 feet above high water, from a green lamp-post on the quay on the southern side of Valdibora Bay, visible 4 miles.

A fixed red light is exhibited, at 59 feet above high water, from a white iron turret, 19 feet high, on Santa Eufemia Point, visible 5 miles.

A fixed green light is exhibited, at 19 feet above high water, from a green lamp-post, 17 feet high, on Salsanta Molehead, Port Rovigno, visible 4 miles.

The above-mentioned lights show white toward the land and are unwatched.

Coal.—Coal can be obtained at Rovigno, about 1,000 tons being kept in stock.

A lifeboat is stationed at Rovigno.

Coast—Beacon.—On **Asino Shoal**, about $1\frac{1}{2}$ miles southward of Rovigno, in $6\frac{1}{2}$ feet water, there is a beacon 18 feet high, consisting of a staff surmounted by two open disks, painted white. Vessels should not pass between this shoal and Asino Islet.

Directions.—On making the land when abreast of Rovigno, the high conspicuous steeple of Santa Eufemia at Rovigno will be readily made out. Vessels from the southward may pass at a short distance westward of San Giovanni di Pelago, Astorga, and St. Andrea Islets, and inshore of Bagnole Islet. The northwestern side of San Giovanni di Pelago is shoal.

Bagnole, a small islet 1,200 yards westward of Santa Caterina, is steep-to and may be passed on either side as most convenient.

The passage on either side of Santa Caterina Island may be taken by small vessels; they must avoid its southeastern extremity, which is shoal about 100 yards off.

Anchorage.—There is temporary anchorage off Rovigno in a depth of about 17 fathoms, sandy bottom, with the cathedral bearing about 86° distant $3\frac{1}{2}$ miles, and San Giovanni di Pelago Lighthouse 126° .

The coast from Auro Point, the southern extremity of Port Santa Caterina, to the Fasana Channel, 9 miles farther southward, is not so high as in the vicinity of Rovigno and gradually becomes lower toward the south. There are several small bays, seldom visited except by coasters to load with firewood, and all are open to the westward. As far as Barbariga Point, 6 miles southeastward of San Giovanni di Pelago Lighthouse, it is bordered by islets or rocks and sunken dangers, which, except the Porer Shoal, do not reach more than $\frac{3}{4}$ mile from the shore. The southernmost of the islets is Porer.

Light—San Giovanni di Pelago.—A group flashing white light is exhibited, at 75 feet above high water, from a white octagonal tower, 69 feet high, on the summit of San Giovanni Islet, visible 14 miles.

Fog signal.—In answer to a vessel's fog signal, a foghorn, worked by hand, gives a short blast followed by a long blast. (See Light List.)

Canale di Leme.—The entrance to this narrow and deep inlet is about $1\frac{1}{2}$ miles southward of Port Orsera. The channel runs in eastward nearly 6 miles, its greatest breadth being a little more than 600 yards, and it gradually narrows toward the head. It is entirely bordered by high land, the shores are steep; it has depths of from

17 to 14 fathoms, and at the inner end 10 fathoms, hard mud, good holding ground throughout.

Water is scarce; a large quantity of firewood is exported.

Conversada Shoal, situated on the northern side of the entrance to the Canale, about 1,200 yards southward of Lunga Island.

Leme Shoal, nearly $\frac{1}{2}$ mile in length east and west, lies near the middle of the entrance. It has from $1\frac{1}{2}$ to 4 fathoms water upon it, the least depth being near the eastern end, the edge of which is marked by a white buoy with topmark in 13 feet water. (Carried away 1915.)

Fojaga Shoal, which projects southward 300 yards from the northern entrance point, with 6 feet water at its extremity, is steep-to; it is marked by an iron post surmounted by two open disks, placed at right angles, 16 feet above the sea, in 13 feet water on the extremity of the shoal.

The best channel into the Canale is nearly 1 mile wide between Leme Shoal and Croce Point on the southern side of the entrance; this point is high, steep-to, and easily recognized at a distance. The channel on the northern side, between Conversada and Leme Shoals, is about 600 yards wide.

Valdibora Bay, on the southern side of which Rovigno is situated, is open to the westward, but is partly sheltered from northwesterly winds by the Figarola Islands.

Shoals.—Figarola Bank, with $3\frac{1}{2}$ fathoms, lies 400 yards northward of the northern extremity of Great Figarola Island, and Mueva Shoal, with $3\frac{1}{2}$ fathoms, lies 400 yards southeastward of the same island; in the center of the bay is the Squero Shoal, with 5 fathoms least water.

Between Squero Shoal and the town of Rovigno the depth is 13 fathoms, mud, and this is the best berth for large vessels. Small vessels anchor farther in, and secure to the shore under the town. There are three mooring buoys in this bay.

Water.—There is a conduit of spring water on the shore of this bay.

Rovigno.—The town of Rovigno stands on a rocky projection terminating in Santa Eufemia Point, with a bay on either side of it. It contains several churches, including a cathedral built after the model of San Marco at Venice; two hospitals; manufactories of sailcloth, shipbuilding yards, etc.; and contains a population of about 10,300. Several trading vessels belong to the port, and a number of small craft are employed in the sardine and tunny fisheries. It carries on considerable trade with Venice, Trieste, and the various ports of Dalmatia. A branch line of railroad connects Rovigno with the main Istrian Line about 9 miles in the interior. Water is scarce, but all kinds of provisions may be procured.

This town is connected with Pola by telephone.

Port Rovigno is the small bay southward of the town, which is formed between it and Santa Caterina Island, about 75 feet high; the anchorage is indifferent, being entirely open to the westward, and is visited by small vessels only.

The best berth is in Port Santa Caterina, the bay southeastward of Santa Caterina Island, which is connected with Port Rovigno by a $3\frac{1}{2}$ -fathom channel between the eastern end of Santa Caterina Island and the shore, the shoal water extending eastward from the island being marked by a beacon with white ball; vessels passing from one port to the other must keep eastward of this beacon.

There are two mooring buoys in Port Rovigno. Boats find shelter on the eastern side of a mole projecting about 200 yards southward from the town.

There is anchorage for small vessels in Ronzi and Bandon Bays, northeastward of Cosada Islet, in depths of 4 or 5 fathoms.

Pola.—The town of Pola, built on the southern shore of the inner harbor, is one of the most ancient in Istria, and several interesting Roman remains are still visible, particularly the amphitheater built of massive blocks of white marble. The dockyard crane is very conspicuous. The only other building deserving special notice is the cathedral, built in the ninth century. Pola being in the neighborhood of marshy grounds was formerly very subject to fever and ague; extensive plantations of the eucalyptus have greatly reduced sickness from this cause.

Naval station.—Being the principal Austrian naval station, it has its government dockyard, with building slips, dry docks, large slip and balance dock, steam hammers, molding appliances, and marine hospital where English seamen are admitted on payment of maintenance, barracks, etc. There is also a commercial port within and eastward of Olivi Islet, without dock or any means for executing any but light repairs. Extensive fortifications crown the heights round the port, and numerous forts and batteries command the entrance.

Pola is the terminus of the Istrian railroad by which it is in direct communication with Vienna, and by branch lines with Rovigno, Trieste, Fiume, etc. The station is at the eastern side of the town.

The civil population is small, the principal part of the population being the government workmen, sailors, and soldiers.

Pola being essentially a military port has little or no trade, the imports being for local use and for the military establishments. A small quantity of wood, lime, and stone is exported to Italy.

Communication is maintained with Trieste, Fiume, and Dalmatia by the steamers of the Austro-Hungarian Lloyd's company.

The port is an exceedingly fine basin, almost landlocked, with room for a great number of vessels of any size, and, as it is surrounded by hills, the Bora is seldom felt with much force. The entrance is open to the northwestward and is between Cristo Point on the north and Cape Compare, which is rather high and steep, on the south. From thence the port trends first southeastward and then northeastward, forming a bend to the southward. About $1\frac{1}{2}$ miles within the entrance are three small islets dividing the interior into two almost equal parts, the outer and inner harbors; these islets are: Santa Catarina, a low islet on the north; San Andrea, the middle islet, large, rather high and strongly fortified; and San Pietro, a few yards from the southern shore, low, connected with the shore by a causeway, and also fortified.

Breakwater.—A breakwater is being constructed about $\frac{3}{4}$ mile northward of Cape Compare; it is above water for nearly its whole length (May, 1914).

Inner harbor.—The passage between San Andrea and Santa Caterina Islets is (1912) prohibited, dredging being in progress there.

Inner harbor.—The passage for large vessels into the inner harbor is between San Andrea and San Pietro Islets; it is about $\frac{1}{4}$ mile wide, and has a depth of 13 to 14 fathoms in the fairway, and 11 fathoms in the anchorage off the arsenal. A shoal extends a short distance from San Pietro; it is marked by a white floating beacon moored on its eastern edge about 100 yards from the islet.

The passage between the two northern islets, and also between them and the northern shore, is fit only for vessels of light draft.

Dockyard—Olivi Islet.—In the inner harbor, off the town, is the islet of Olivi, so named from its having been formerly covered with olive trees; it is now occupied by the Government workshops and buildings, and is connected with the dockyard in the town by a mole and an iron swing bridge, which opens to admit of vessels passing through into the commercial port. On this island are two large building slips, roofed, and two dry docks, one being large enough to take an ironclad; also a patent slip worked by a balance or floating dock, the vessel being first lifted in the dock and then run onto the slip on prepared ways and shored up as usual. Three buoys are moored off the balance dock to mark the distance within which passing vessels should not approach it.

A rocky shoal extends northeastward of Olivi, leaving a 3-fathom passage between it and the shore bank; the edges of the shoal are marked by buoys. A disk on the lamp-post at the landing place in range with a disk on the northeastern angle of Casa Wassermann leads eastward of Olivi Shoal.

The depths in the commercial harbor are being increased by dredging.

Harbor regulations.—The war port district of Pola extends from Gustigna Point on the west to Forticcio Point on the east, including the bays and harbors on and the islands fronting the coast. It is prohibited to photograph or draw plans, etc., of structures in the territory of the war port.

The military port of Pola is between lines joining Cape Compare and Cristo Point on the west and the arsenal and San Pietro Bay on the east.

The commercial harbor is eastward of the military port.

No merchant vessel is allowed to enter Vergarola Bay, Zeno (Fisella) Bay, Figo Bay, Zonchi Bay, the inner basin of Port San Nicolo in Scoglio Minor Island, the Bays of Bus, Lunga, Benedetto, Sanadigo, Antilena, Lago, Can, Terra Alta, Ovina, Fuora, Saccorgiana, Cacoja, or Centinara, except in cases of distress or with special permission.

All merchant vessels are prohibited from approaching the ammunition establishment and wood preserves in Vallelunga, inside the line marked by buoys joining the boundary stone near Aguzza Point to the municipal baths, or to approach the equipment and construction arsenal.

All merchant vessels within a distance of 1 mile from the coast of the war port district can be required by the captain of the port to withdraw, except in cases of distress or if proceeding to the commercial port, when their national flag must be hoisted on approaching.

Foreign naval vessels must anchor in the outer harbor of the military port westward of a line joining Monumenti Point with the outer end of the pier in Vergarola Bay, in positions assigned them by the captain of the port.

Merchant vessels with petroleum on board must not approach the harbor at night nor touch at Pola unless such cargo is for that port, when it must be quickly transferred under official supervision to the allotted magazine.

Anchorage is prohibited in the area northward of San Andrea Island between lines drawn from Monumenti Point to the southwestern extremity of San Andrea Island, and from the southeastern extremity of that island to Aguzza Point.

A mooring buoy will be assigned to a vessel entering the war port by the guardship, but after obtaining pratique the vessel will proceed to her loading or discharging buoy. Vessels with stores for the dockyard or coal store will be berthed by the chief of the naval dockyard and vessels not granted pratique by the captain of the port.

All movements and mooring of vessels are carried out under the responsibility of their captains, except when an officer of the war navy, sent on board specially, assumes responsibility. Movements of vessels are not permitted without the consent of the war navy, except in unforeseen cases which affect the security of the vessel or of the dockyard.

The anchorage is good everywhere; the best berth is southward of Olivi Islet in 11 fathoms water, mud bottom. There are several mooring buoys in the outer harbor. Small craft go alongside the quays of the town.

Time signals.—A rectangular shutter apparatus, about 6 feet square, on the roof of the Imperial Hydrographic Office, is closed daily at 5 minutes before noon, standard mean time, and opened by hand in such a manner that the sky can be seen through the frame of the apparatus, at noon, or 23h. 0m. 0s. Greenwich mean time.

A gun at the Harbor Castle is fired on the closing of the shutter at noon standard mean time.

Should either or both the signals be incorrect, the shutters will be closed one minute after the signal and repeatedly opened and shut for the space of one minute.

When required by vessels of the Imperial Austrian Navy, on every Tuesday, and on the 5th, 15th, and 25th of each month, the shutter is closed at 10h. 45 m. a. m. and opened at 11h. 0m. 0s. standard mean time, or 22h. 0m. 0s. Greenwich mean time. Ten or more signals will follow the first at intervals of one minute, the shutter remaining open for 10 seconds after each signal, and when the series is completed the shutter will be opened and closed rapidly several times.

Comparisons with chronometers can be obtained direct by applying at the hydrographic office.

Tides.—It is high water, full and change, at Pola at 9h. 5m.; springs rise $1\frac{1}{4}$ feet, neaps 9 inches, above the datum of the chart, which is approximately the mean of all low water.

Lights—Cape Compare Breakwater.—An occulting green light is exhibited, at 33 feet above high water, from a column 19 feet high, on a cylindrical hut at the site of the head of the breakwater under construction 1,400 yards 346° from Cape Compare, visible 5 miles. The light is unwatched.

San Andrea Island.—A fixed red light is exhibited, at 17 feet above high water, from a black hut 17 feet high, on the southern point of San Andrea Island, visible 5 miles. The light is unwatched.

Range Lights.—Front: Two fixed green lights, placed vertically, are exhibited from the northwestern extremity of San Pietro Peninsula, visible 3 miles. The lights are unwatched.

Rear: A flashing red light is exhibited from the buildings of the Naval Land and Marine Works Office, situated 700 yards 132° from the preceding light. The light is unwatched.

These lights in range lead through the outer harbor.

Lights are exhibited from a lamp post 23 feet high, on the head of Kaiserin Elizabeth Mole, and at 105 feet above high water, from the roof of a house 45 yards northward of the amphitheater, in the rear of the former and forming range lights to the pier.

Harbor lights.—Two fixed white lights, placed vertically, are exhibited at 28 and 34 feet above high water, from a pole 27 feet in height above the ground, at the head of San Pietro Bay, in the northeastern extremity of the port, visible 2 miles.

Two fixed red lights, placed vertically, are exhibited, at 24 and 18 feet above high water, from a lamp post 23 feet high, on the head of Kaiserin Elizabeth Mole, visible 4 miles. These lights show white toward the inner end of the mole.

Two fixed green lights, placed horizontally 5 feet apart, are exhibited, at 105 feet above high water, from the roof of a house 45 yards northward of the amphitheater, visible 2 miles.

A fixed red light is exhibited, at 21 feet above high water, from an iron lamp post 17 feet high, on the head of San Tomaso Mole, near the infantry barracks, visible 3 miles.

A fixed green light is exhibited, at 25 feet above high water, from a lamp post on a black and white base, 23 feet high, on Franz Joseph Quay, visible 2 miles. The light shows white toward the land.

A fixed green light is exhibited, at 26 feet above high water, from a black and white structure, eastward of Olivi Island Bridge, visible 2 miles.

The harbor lights are unwatched.

Lightbuoy.—A white conical lightbuoy, exhibiting an occulting white light, is moored about $\frac{1}{4}$ mile northward of Cape Compare, and nearly 200 yards northwestward of the light-beacon on the site of the head of the breakwater, extending northward from that cape. Vessels must pass northward of the buoy.

Torpedo ground.—On the northeastern side of the entrance to Pola, between Grosso Point and Zonchi Battery, is a space generally used for submarine mining or torpedo experiments. During practice with submarine mines in the outer port, the direction of the line in which the mines are laid will be marked at each extremity by a red flag during the day, and at night by a red light above a white light, 1½ feet apart. These signals will be hoisted on the mast of the guard ship moored near the middle of the outer port, and on a mast erected in Fisella Valley, on its southwestern shore.

During the practice, all vessels are required to pass northward of the guard ship, that is, between her and Zonchi Bay.

Torpedo experiments are sometimes conducted on the southwestern shore near Fisella Battery, in which case similar precautions are taken to keep vessels clear of the ground.

Gun practice by the Imperial Navy is at times carried out in Valmaggiore Bay, when navigation is prohibited within the line joining Cristo and Grosso Points.

Rifle and gun practice ground.—The area seaward between Stoja Point, on the north, and San Giovanni Point, on the south, is reserved for small arm and gunnery practice.

During small arm practice one red ball will be shown from flag-staffs at Monte Saline, at Stoja Point, and at Verudella Fort.

During gun practice, two red balls will be exhibited from the above-mentioned places.

These balls will be hoisted one hour before the firing commences.

Vessels passing along the coast are prohibited, when these signals are hoisted, except under pressing necessity, from passing inside a line joining Stoja Point to San Giovanni Point. Fishing is prohibited within 2 miles seaward of this line, and vessels beating to windward must keep the same distance from it, except in case of urgent necessity.

A naval tender or stream launch will be at hand to enforce the above regulations, the infringement of which is punishable by a fine.

Regulations for entry and exit.—Vessels proceeding in or out of the Central Naval Harbor, are not allowed to exceed a speed of 6 knots when eastward of a line joining San Pietro and San Andrea.

Lighters displaying the flag V, International Code, show that divers are at work and such lighters must be passed at a distance of 500 yards with the vessel's engine stopped.

Regulations.—Particular attention is necessary to the signal carried by dredgers, when entering or leaving this port.

Boom-defense practice.—Floating booms are frequently placed for practice in the naval port of Pola, and a guardship, moored near them, will warn approaching vessels, either by hailing or by sound signals, not to proceed further.

Docks.—They are all Government docks, and are only available to merchant vessels under extraordinary circumstances.

Coal and supplies.—The Austrian Government has a large coaling station here; foreign vessels can only be supplied from it in cases of necessity. There is (in normal times) a stock of about 3,000 tons in private stores. Water is abundant and may be obtained at several places; a supply sufficient for a fleet may be procured from a spring

called the Roman baths, near the beach about 400 yards from the town.

Directions.—The land about Pola generally is not high, and the only remarkable points near the entrance are Capes Compare and Brancorso, each with a fort or battery over them; both are steep and are the highest points on this part of the coast. The latter is about $7\frac{1}{2}$ miles northwestward of Cape Promontore and may be easily recognized from it, being the first rather high land northward of that cape.

On approaching the harbor, the square fort, the town, and the Amphitheater may be seen at the head of the bay, and, as there are no sunken dangers and but one passage into the port for large vessels, viz., between San Andrea and San Pietro Islets, a vessel has no difficulty in reaching the anchorage. Vessels entering or leaving the Commercial Harbor must give a good berth to the Balance Docks in passing them.

Vessels are prohibited from passing between the light buoy and the lightbeacon on the head of Cape Compare Breakwater; works are in progress.

At night the occulting green light on the head of Cape Compare Breakwater, and the fixed and flashing light on Peneda (Peneda) Point, the southern extremity of the Brioni Islands, indicate the position of the port. A sailing vessel prevented by contrary winds from entering, may anchor in about 20 fathoms, mud, under the land between the two capes.

The coast, southward of Cape Brancorso, is uncultivated and gradually decreases in height toward Cape Promontore, about $7\frac{1}{2}$ miles distant. There is, generally, a depth of 20 fathoms at 600 or 800 yards from the shore. There are several small bays which afford shelter from off-shore wind; of these the most important are Ports Veruda and Olmo.

Mount Cope, 187 feet high and 5 miles southward of Cape Compare, separates the Ports of Olmo Grande and Olmo Piccolo. Olmo Grande is a narrow inlet affording shelter from all winds to vessels drawing not more than 10 feet. Olmo Piccolo, to the southward, is more exposed and suitable for boats only.

Measured distance.—Beacons are erected on the coast between Capes Compare and Promontore for marking a measured distance of 4 miles. The northwestern beacons are near Cape Brancorso and the southeastern beacons are on the southeastern slope of Mount Cope; the beacons in range bear 26° . Other beacons divide the distance into 1-mile sections, the second section from the southeastward being further divided into $\frac{1}{2}$ miles.

The line of direction on which to run the measured distance, 296° and 116° , is shown by two beacons erected on Cape Promontore, about 500 yards within Chersine Point.

Austrian naval vessels, when running on this measured distance, carry a pennant above flag A of the international code, and all vessels are warned to keep clear of them when they are displaying this signal.

Vessels running trials on the measured distance and flying international code pennant A, finding for any reason, such a much smoke, that the signal is not likely to be seen by any vessels near the course, give short blasts with the siren or steam whistle, or short flashes with a searchlight, until satisfied that the signal is understood.

Target-practice marks.—The undermentioned buoys and a lighter in connection with gunnery practice, in the approach to port Pola from the southward, are at times moored in the following positions off the coast:

- (a) A buoy, at a distance of 4.4 miles 208° from Fort Musil.
- (b) A buoy, at a distance of 2.3 miles 176° from Fort Musil.
- (c) A lighter, at a distance of 3 miles 193° from Fort Musil.

NOTE.—As a warning to the mariner these marks are retained on the chart, although they are only occasionally in position.

Saccorgiana Bay—Buoys.—Off Saccorgiana Bay, $2\frac{1}{2}$ miles south-eastward of Cape Compare, there is moored a conical buoy, and also two mooring buoys.

Port Veruda is $3\frac{1}{2}$ miles southeastward of Cape Compare, and consists of two narrow inlets bordered by hills from 100 to 140 feet high. The passage to Cacoja Bay, the southern inlet, is both shallow and narrow; access to it is around the northern end and eastern side of Veruda Islet; the northern inlet is easier of access and to be preferred; here vessels anchor with Mount Gallie bearing 64° , in a depth of 4 or 5 fathoms, hard mud, and are well sheltered from all winds. This inlet extends 1,400 yards beyond the anchorage given, but the water almost immediately above the anchorage shoals to 6 feet and less.

A vessel prevented by contrary winds from entering Port Veruda may anchor in a depth of about 23 fathoms, sand, shells, and mud, between Veruda Islet and San Giovanni Point.

Light.—A fixed red light is exhibited, at 33 feet above high water, from an iron support, adjoining a white house, 22 feet high, 44 yards within Verudella Point, visible 6 miles. (For the arc of visibility see Light List and chart.)

Directions.—Veruda Islet, 62 feet high, is at the entrance of the two inlets forming the port and may be recognized by a ruin on its summit. Two other islets, Bisse and Frasher, are just southward of it, and the three are united to the coast by reefs. The entrance is

between Veruda Islet and Verudella Point on the north. Cape Promontore assists to indicate the position to vessels approaching from the southward, and Capes Compare and Brancorso to those from the northward. At night the red light shows the entrance to the port.

As foul ground extends around Verudella Point, it should not be approached nearer than 200 yards.

Cape Promontore, the southern extremity of Istria, is a low narrow hilly projection, difficult to define when the atmosphere is not very clear. There are the Porer Rock and several other dangers off the cape, and the currents are often rapid with strong eddies in its vicinity caused by streams setting out of the Gulf of Quarnero.

It is customary for vessels bound to Venice or its neighborhood to sight Cape Promontore; on approaching it from the eastward in clear weather, the steeples of the three villages of Sisano, Medolino, and Promontore may be seen on the hills in succession, together with the Porer Rock Lighthouse; when from the opposite quarter, the steeple and village of Promontore only, with Porer Lighthouse, are visible.

The Porer Rock.—This rock, rising about 23 feet above the level of the sea, lies 23° nearly 1 mile from the western extremity of Cape Promontore. A rocky shoal, with a depth of 3 fathoms, extends 500 yards southwestward of Porer Rock; and between the rock and the shore are many shoal patches described below.

Lights.—A group occulting white light is exhibited, at 115 feet above high water, from a white stone circular tower with a green lantern, over a dwelling 102 feet high, on Porer Rock, and is visible 16 miles. (For the arc of visibility see Light List and chart.)

The light exhibited from the semaphore platform is temporarily discontinued.

Fog signal.—A steam foghorn is sounded. (See Light List.)

Telegraph and signal station.—There is a telegraph and signal station on Porer Rock, and communication can be made by the international code of signals. The station has telephonic communication with Pola, Fasana, and Brioni.

During gun practice near Cape Promontore, the international code signal G. O. (you are in the line of fire, or within range of forts) will be hoisted at Porer Rock Signal Station.

Felonega Islet and Shoals.—Felonega Islet is about 200 yards off the western extremity of Cape Promontore, on the northwestern edge of a rocky ledge extending from the shore to within 400 yards southeastward of the Porer Rock Lighthouse; in the middle of the ledge are two patches with 2 to 6 feet water, and elsewhere from 3 to 4 fathoms; and about 350 yards east southeast of the islet is another 2-foot patch.

Beacons.—Two posts, surmounted by white disks, stand on rocks situated 900 yards 53° , and 900 yards 78° from Porer Rock Lighthouse. Their existence must not be depended on, as they are liable to be washed away by the sea.

Sunk Rock (Pericolosa).—This danger lies nearly $1\frac{1}{2}$ miles 163° from Porer Rock Lighthouse and has 9 feet water on it. There are depths of $5\frac{1}{2}$ and 7 fathoms close to on its southern and eastern sides; and immediately outside, deep water all around. Between this rock and Porer Lighthouse is a 5-fathom patch, steep-to, 1,800 yards from the lighthouse.

These dangers are easily cleared by day by cross bearings of Cape Promontore and Porer Rock Lighthouse.

Light.—A group flashing white light, with a red sector, is exhibited, at 48 feet above high water, from a truncated conical tower, 61 feet high, on the shoalest part of Sunk Rock (Pericolosa); the white light is visible 12 miles and the red light 8 miles. (For the sector see Light List and chart.) The light is unwatched.

Buoy.—A red conical buoy is moored on the northern side of Sunk Rock Shoal in 7 fathoms.

At night, from the westward, in standing toward Cape Promontore or the land northward of it, Porer Rock Light should be kept in sight bearing eastward of 146° ; and, in crossing the sector of red light shown over Sunk Rock, Galiola Islet Light should be kept eastward of 87° until Merlera Point Light (fixed red) is in sight, bearing 37° .

Gulf of Medolino.—This gulf is the small but deep inlet between Cape Promontore and Merlera Point; the distance between the two points is 4 miles, but, within, the gulf narrows considerably and extends more than 3 miles northwestward, affording some well-sheltered anchorages. There are several islets and rocks in the gulf, which, as well as its shores are bordered by shallow water, rendering caution necessary in threading the way into the gulf. The best of the anchorages are the following:

Port Rosso is about $\frac{1}{4}$ mile northwestward of the eastern extremity of Cape Promontore; it is a small bight protected from sea winds by Fenara and Cielo Islets and Rocks and affords shelter to coasters; it has a depth of 3 fathoms, muddy bottom.

Castello, Ronze, Medolino, and Pomer, are small anchorages near the head of the gulf, also suitable to coasting vessels only. The passage to them is about 400 yards wide and the depth from 3 to 4 fathoms.

Vessels occasionally anchor between Cielo and Trombola Islets, in $7\frac{1}{2}$ to 11 fathoms, good holding ground.

Beacons.—The following beacons mark the most dangerous reefs and facilitate the navigation of the Gulf of Medolino. On a reef

between Fenera and Cielo Islets is a beacon consisting of an iron staff surmounted by an open ball and iron vane; it stands in 9 feet water.

On the shoal extending from the southern side of Cielo and at its southeastern extremity in 3 feet water is a similar beacon; there is a 6-fathom channel between these beacons.

On the shoal extending from the southwestern shore of Cielo is another beacon of the same character; it also stands in 3 feet water; and on the Sorico Shoal, 800 yards northward of the last-named beacon, is another, like it in shape and in 3 feet water.

Vessels standing up the gulf pass between these two latter beacons.

On Castello Point, near the health office, close to the shore and but little above the sea level, is a white pyramid beacon of masonry 10 feet high.

Directions.—There are three channels to the anchorages in the Gulf of Medolino; in taking either, the numerous rocks and shoals have to be carefully avoided. The first, which is usually preferred by vessels bound to Rosso, is between Cape Promontore and Fenera Islet. Mid-channel should be preserved by steering for Cielo, and, when the entrance to the port opens out, the channel either between Solkovatz Islet and the coast or northward of this islet, but keeping it close aboard, should be taken, according to the direction of the wind.

To proceed to the anchorage between Cielo and Trombola, 800 yards to the northward, the passage between Santa Marina and Cielo Islets is generally taken and the anchor dropped northward of the latter. This channel presents no difficulty and should be used by vessels bound to the anchorages at the head of the gulf, as it is nearly a straight course.

If the channel leading to Rosso should be taken, the shore should be avoided on arriving abreast of Port Rosso and a course steered between the southwest Cielo beacon and that marking the Sorico Shoal, and then between Trombola and Cielo Islets, after which the channel is open to proceed up the gulf as before.

There is also a channel between Santa Marina Islet and the northern shore, fit only for very small vessels; to clear the shoals on either side care should be taken to keep in mid-channel, where there is a depth of 2 fathoms on the shallow bar connecting the island with the shore.

No provisions or supplies of any sort are to be obtained at any of the little ports and anchorages in the Gulf of Medolino. Even water fit for drinking is very scarce.

Merlera Point, on the western side of the entrance to Great Quarnero Channel, 4 miles east-northeast of Cape Promontore, is 66 feet high, bare, and steep-to. Two islets, the Lielvela Grande and

Lievela Piccolo, lie 1 mile southwestward of it. There is a depth of 4 fathoms between the two islets, but between Lievela Grande and the shore the water is shallow.

Light.—From a square tower connected with the keeper's dwelling, 75 yards from the shore of Merlera Point and at an elevation of 70 feet above the sea, is exhibited a fixed red light, visible 6 miles. The limit indicated by the first bearing leads 1,200 yards outside the southeastern point of Fenara Island and 1,600 yards southeastward of Sunk Rock. (See Light List.)

CHAPTER VI.

QUARNERO GULF AND ISLANDS.

Quarnero Gulf.—The waters of this extensive gulf wash the eastern coast of Istria on the one side, and the entire seaboard of Croatia, with part of the coast of Dalmatia, nearly as far as the town of Nona, on the other. It extends southward to Bianche Point of Grossa Island, and eastward to Ljubaz Strait, which separates the southern end of Pago Island from the coast of Dalmatia, and contains numerous islands, rocks, and shoals.

The larger islands in the Gulf of Quarnero, as well as those on the coast of Dalmatia, are in communication with each other and with the mainland by means of telegraph cables, and it is necessary to avoid anchoring or fishing in their vicinity.

The eastern coast of Istria includes the space between Merlera Point and Fiume, an extent of about 45 miles, and presents mostly a wild and desolate appearance, consisting, as far as the eye can reach, of extensive forests with a few intervals of cultivated patches; the sides of Monte Maggiore and the vicinity of Fiume are almost the only exception to these features. The high lands of Istria are chiefly on this side of the Peninsula and are ramifications of the Julian Alps. The range of Monte Maggiore or Caldero, 4,580 feet high, being the most remarkable for the abruptness with which its eastern side rises from the midst of the hills branching from it, and which gradually decrease in height to the south.

The coast is generally rocky, precipitous, and of forbidding aspect; but there are no dangers at $\frac{1}{2}$ a mile from it; among its indentations are a few narrow bays and inlets, but none suitable for large vessels.

In fine weather, the ebb and flow of the tidal wave are regular; at other times, the degree of irregularity, caused in a great measure by the channels among the numerous islands, depends on the force and direction of the wind.

The Bora is the wind most severely felt in this gulf, as well as on the western side of Istria, and scarcely a blade of grass grows on spots fully exposed to it; but it is the less dangerous to vessels, as it blows either off the shore or parallel with it. Strong southeasterly winds cause a considerable but not dangerous sea to roll in. The navigation of the gulf is therefore easy, and dangerous only from the frequent heavy gales. (See Great Quarnero Channel.)

Aspect.—The chief points of recognition, on approaching the Quarnero Gulf from the southeastward, are Mount Ossero, 1,920 feet above the sea, near the northern end of Lussin Island; afterwards Monte Maggiore, and then Cape Promotore and Porer Rock Lighthouse. Mount Ossero is easily recognized by its naked conical white top. Monte Maggiore, which rises above the surrounding mountains and is visible at a great distance, has a conical forked summit. Cape Promontore consists of a number of low hillocks, mostly covered with bushes, which, in clear weather, are first seen on the horizon; 1 mile southwestward of it is the Porer Rock Lighthouse, as described in the preceding chapter. The summits of both Ossero and Maggiore are clouded shortly before and during sea winds, especially southeasters, and become clear suddenly at the cessation of them.

There is a telegraph office, with a restricted day service, at Carnizza, which has also telephone lines locally and to Altura.

Port Cuje is a small inlet about $1\frac{1}{4}$ miles northward of Merlera Point, and is suitable for small vessels only. The point on the southern side of entrance is shoal, and a reef of rocks extending nearly $\frac{1}{2}$ mile from the shore, of which Lakosase Rock is just above water, projects rather more than half way between Merlera Point and the port, and is in the track of vessels bound to Cuje.

Port Bado.—Between Port Cuje and Zuffo Point, about 4 miles farther on, the coast is high, steep, and well-wooded. On the northern side of Zuffo Point is Port Bado, an inlet about $1\frac{1}{4}$ miles in length and nearly $\frac{1}{2}$ mile in width, surrounded by high land; in almost every part of this port coasting vessels load with firewood. The depth is 24 or 25 fathoms in the entrance, but there is anchorage at the head of the bay, in 9 fathoms, mud. Water may be obtained.

In entering Port Bado, the high Zuffo Point should be closed so as to avoid a rocky shoal extending 300 yards southward from Forticcio Point, the northern point of entrance; the shoal uncovers at low water.

Vignole Bay, about 2 miles northward of Port Bado, affords shelter to small vessels during westerly or northerly winds, but it is quite exposed to those from the southern and eastern quarters. A rock with 9 feet water lies in the middle of the entrance.

Arsa Channel is a natural inlet, 6 miles in length and somewhat less than $\frac{1}{2}$ mile in breadth, with general depths of 6 to 20 fathoms; it receives the waters of the Arsa River, the source of which is Lake Gessaro at the foot of Monte Maggiore. There is good anchorage for vessels of moderate draft, which can ascend as far as Rupa Cove. Southwesterly winds send a sea into the entrance, which, however, is not felt beyond Castelvechio, 2 miles within the entrance.

Vessels may anchor on both sides of the inlet, but as the depth increases rapidly toward the middle, Bora squalls would in all probability cause the anchor to drag considerably before bringing up, and it is therefore advisable to lay out an anchor to the north-eastward. Vessels anchoring should prefer the eastern shore.

Port Carnizza is an inlet on the western shore at the entrance to the Arsa Channel; it is surrounded by high land and has a depth of about $5\frac{1}{2}$ fathoms, muddy bottom. It is seldom visited except by large boats to load with firewood. The best berth is off the village. Water may be obtained at the upper part of the inlet.

Port Gradaz is an indentation of the land 2 miles above the entrance on the eastern side of Arsa Channel and is the best harbor in the inlet; it has a depth from 10 to 18 fathoms. Mount Ubas, 298 feet high, the shore of which forms the southern side of Port Gradaz, serves to indicate the entrance to the Arsa Channel or inlet; it is a tongue of land covered with wood, of whitish appearance near the sea, and terminates southward in Point Ubas, on which stands a lighthouse.

Coal wharves.—In Vagna Bay, situated 1,200 yards northward of Rupa Cove, in Arsa Channel, are three woden moles for coaling purposes; the deep channel to the bay is marked by stakes. There is a mooring buoy off the coal wharves.

Light.—At Ubas Point, on the western side of the Great Quarnero Channel, but forming the eastern point of entrance to the Arsa Channel, stands a square three-storied lighthouse, from which, at the respective elevations of 73 and 44 feet above the sea, are exhibited two fixed white lights, placed vertically, and visible 10 miles. (For arc of visibility see Light List.)

Nera Point, $3\frac{1}{2}$ miles eastward of Ubas Point, is of considerable height, thickly wooded, and visible at a considerable distance, as is also Mount Goly, 1,761 feet high, of which it is a spur. Between Ubas and Nera Points are the two small bays of Koromacna and Voschizza, both open to the southward, but sheltered from northerly winds between west-northwest and east-northeast.

A vessel should not anchor nearer the shore than in a depth of 11 fathoms, in order to avoid rocky bottom, especially in Koromacna, the westernmost of the two bays. There is a mooring buoy in Voschizza Bay.

Light.—On Nera Point, from a lantern at the corner of a stone dwelling, 23 feet high, a fixed white light, elevated 48 feet above the sea, is exhibited, visible 11 miles. (For arc of visibility see Light List and chart.)

Port Lungo, about 5 miles northward of Nera Point, is an inlet more than 1 mile deep, open to the southward, with a depth of 22

fathoms at its entrance, decreasing to 8 fathoms at its head, good holding ground. The inlet is too narrow to be entered except by small vessels. Southerly and southeasterly winds send in a heavy sea, and it is necessary to secure to the weather shore against the violent Bora squalls. There are no villages here.

Port Rabaz, about 2 miles northward of Port Lungo, is a bay about $\frac{1}{2}$ mile deep and 600 yards wide; it affords shelter to coasters from westerly and northerly winds, and the holding ground is good. Southerly and southeasterly winds are severely felt, and the Bora reaches the bay in violent gusts. There are a few houses on the beach. This anchorage serves as a port to the ancient town of Albona, standing on an eminence about $1\frac{1}{4}$ miles westward of it.

A rocky shoal, with 4 feet least water, extends about 200 yards from St. Giorgio Point, on the southern side of entrance to the bay. There are two mooring buoys off the houses at the head of the bay.

Water may be obtained in abundance at a spring.

Telegraph.—There is a telegraph station at Port Rabaz.

Light.—On San Andrea Point, at the eastern side of entrance to Port Rabaz, is a turret on a dwelling, from which is exhibited at an elevation of 34 feet above the sea a fixed red light, visible 5 miles.

A fixed green light is exhibited, at 16 feet above high water, from a lamp-post, 15 feet high, on the quay, visible 2 miles; it is unwatched.

A lifeboat is stationed at Port Rabaz.

Coast—Fianona Bay, situated 3 miles northward of Port Rabaz, is about 600 yards wide at the entrance, gradually narrows to its head and extends nearly 2 miles in a northwesterly direction. The depths in it are 27 fathoms at the entrance, decreasing to 4 fathoms, muddy bottom, at the upper and narrower part, where the village of Fianona stands on a hill, the site of the ancient town of this name.

The inlet is open to the southeastward and is visited by heavy Bora squalls, against which it is customary to secure by laying out cables to the shore.

Fianona and Rabaz are the two chief places of export for the produce of the eastern side of the Istrian Peninsula. From seaward Fianona Bay appears like a deep cutting in the mountains.

Water is plentiful and provisions may be procured.

Farasina Channel.—One mile northward of Fianona Bay, Prestenizze Point, the western extremity of the northern part of Cherso Island approaches the Istrian shore within less than $2\frac{1}{4}$ miles, forming a strait, which is the narrowest part of the passage connecting the Great Quarnero Channel with the Gulf of Fiume, and which takes its name from the village and cove of Farasina, in Cherso Island. (For the description of the light on Prestenizze Point see p. 238.)

Fianona Bay—Light.—A fixed green light is exhibited, at 16 feet above high water, from a lamp-post, 16 feet high, on Fianona Quay, visible 2 miles. The light is not visible from Farasina Channel. It is unwatched, and is unreliable in northeasterly gales.

Coast.—Between Fianona and Port Priluka, at the head of Fiume Gulf, a distance of about 15 miles, the coast presents a less desolate appearance than that to the southward. A few villages and patches of cultivation are visible, especially on the slope of Monte Maggiore and in the neighborhood of Fiume. The coast is almost everywhere high, abrupt, bordered by deep water, and without any shelter, except a few little boat creeks protected by moles, and the small ports of Ika, Abbazia, Volosca, and Priluka, all within $3\frac{1}{2}$ miles of the northern extremity of the Gulf of Fiume.

Telegraph cables.—A telegraph cable is laid from Mazar Cove, about $1\frac{1}{2}$ miles northward of Fianona Inlet, to about $\frac{1}{2}$ mile northward of Farasina Cove, in Cherso; both shore ends are marked by turrets, and vessels are cautioned as to anchoring in this vicinity.

Cables are also laid from the Istrian shore to the same landing place in Cherso, from Stupova Cove, 1 mile northward of Mazar Cove, and from another station about midway between these coves.

Lights—Ika.—A fixed red light is exhibited, at 42 feet above high water, from a green lamp-post, 17 feet high, on the northern shore of Port Ika, nearly 12 miles northward of Fianona Bay, visible 4 miles. It is unwatched, and is unreliable during northeasterly gales.

There is a funnel-shaped hole of about 18 fathoms, or probably greater depth about 150 yards from the light structure, in which vessels are liable to foul their anchors.

At Lovrana, on the head of the landing pier, a fixed green light is exhibited from an iron column, at a height of 20 feet. During northeast gales it can not be exhibited. The light is visible 2 miles and it is unwatched.

Abbazia.—There is a conspicuous high chimney, with its upper part black and its lower part white, about $\frac{3}{4}$ mile southward of Abbazia.

Light.—An occulting red electric light is exhibited, at 25 feet above high water, from a white iron column with a red lantern, over a cylindrical house, 22 feet high, on Abbazia Molehead, visible 8 miles. The light is unwatched. (For the arc of visibility see Light List.)

Should electricity fail a fixed red light will be exhibited, visible 6 miles.

Mooring buoy.—A mooring buoy for large vessels is situated eastward of the molehead.

Caution.—At Abbazia, and also at Lovrana, about 3 miles southwestward, harbor works are in progress, and steamers passing near those places should proceed at moderate speed to avoid damage.

Volosca—Light.—A fixed red light is exhibited, at 18 feet above high water, from a green lamp-post, 15 feet high, on Volosca Molehead, visible 3 miles; it is unwatched.

Port Priluka is a small open bay only sufficiently large for a few coasters. Its position in the extreme northern part of the Gulf of Fiume is unmistakable, and is further indicated by the town of Castua, about $1\frac{1}{2}$ miles inland, near which is a white castle on an eminence.

Fiume (Illyrian, Reka), one of the most important commercial towns in the Adriatic, is the only port of Hungary and the chief outlet for its produce; consequently it is of considerable importance. Extending about 2 miles along the seaside, its sea face bordered by quays and containing several imposing edifices, with high land in the background, it presents a picturesque appearance.

Population.—The estimated population of the town in 1910 was 49,806, with 4,600 more belonging to the district, the whole being under the administration of a civil governor. Hungarian is the official language since its annexation to that Kingdom in 1867, but Italian is the language chiefly in use.

Communication.—It is in railroad communication with Trieste, Vienna, and Budapest, the railroad station being close to the shore, with sidings to the various wharves. A good road is carried over the Julian Alps to Carlstadt, where the navigation of the Save and Culpa become available.

The steamers of the Austro-Hungarian Lloyd Co. keep up constant communication with the Levantine Ports; the Anchor Line, with New York; and there are many steamers constantly running between Fiume and the principal English ports.

Trade—Shipping.—The local industries of Fiume, in addition to a tolerably active shipbuilding interest, are the famous paper mills of Smith & Meynier, and an extensive chemical factory. Whitehead's torpedo factory is at the western end of the town and may be known by two small jetties; the machinery can turn out about 300 torpedoes per annum. The petroleum port, not allowed to be entered at night and which is protected by a mole, is eastward of the torpedo works.

The chief imports are petroleum, rice, coal, coffee, jute, maize, etc. The exports are flour, wheat, barley, sugar, prunes, beans, manganese ore, and lumber. Tobacco, salt, and gunpowder are Government monopoly and not allowed to be imported at all. Wine and spirits are subject to octroi. All other articles are at present free of duty.

Coal and supplies.—About 6,000 to 7,000 tons of coal are usually in stock at Fiume, and there is a coal wharf 1,500 feet in length, at which there is a depth of 30 feet alongside.

Provisions of all kinds are good and plentiful.

Water is brought to the quay in a pipe and runs out in a clear cold stream at a height of 5 or 6 feet above the sea, so that a boat of any size may lie under it. The place is convenient, being close to the landing place inside the mole.

Hospital.—There is a hospital here, which is available for seamen if required.

Repairs of any description can be effected, except large castings and rollings.

The port of Fiume is formed by a breakwater named Maria Teresa Mole, extending from the eastern part of the town in a general west-northwestward direction, and inclosing an area about 1,800 yards in length by 300 yards in width at the entrance to 250 yards at the head or eastern end of the port, with depths of from 9 to 21 fathoms, muddy bottom.

Moles.—Within the port six moles extend southwestward from the northern shore. The channel between the western of these moles and Maria Teresa Mole is about 300 yards wide.

Mooring buoys.—There are several mooring buoys in the port.

Petroleum Basin.—The Petroleum Basin is situated about 900 yards north-northwestward of the outer end of Maria Teresa Mole.

The torpedo works are situated from about 600 to 900 yards westward of the Petroleum Basin.

Bergudi Harbor, about 400 yards westward of the torpedo works, is formed by a mole projecting about 500 yards in a westerly direction, and with a pier northward of it jutting out in the same direction, in which steamers with a draft of 26 feet can be accommodated.

Gabriel Baross Harbor.—Close southward of the eastern end of Port Fiume is Gabriel Baross Harbor, 400 yards in length, east and west, by 200 yards in breadth, with a depth of 10 fathoms over the greater part. Just eastward of this port lies the mouth of the Reka, or Recina, River.

A conspicuous object in approaching Fiume from the southward, is the Marine Academy, a large square stone building having a red tiled roof, standing within the western part of the breakwater; it is surrounded by trees, and may be easily recognized by the great number of windows in it. Another conspicuous object is a large grain elevator, the upper part of which is gray zinc; it is the western of the two buildings on the Riva Francesco Salvatore. Mount Drenova, 2 miles northward of the town, is also a good distant mark.

Lights.—Near the western end of the town, about 200 yards from the beach, and nearly abreast the extremity of the outer breakwater, stands a gray cylindrical iron tower 91 feet high, from which, at an elevation of 101 feet above the sea, is exhibited a fixed and flashing electric light with red sector. The light is visible 16 miles. (For arc of visibility see Light List and chart.)

Maria Teresa Mole.—Two fixed red lights, placed vertically, at 23 and 26 feet above high water, are exhibited from a pole on a hut, 26 feet high, on the outer end of Maria Teresa Mole, and are visible 3 miles; the lights are unwatched.

Petroleum Port.—A fixed green electric light, elevated 26 feet above the sea, is exhibited from the Petroleum Port Molehead, visible 3 miles.

Marie Valerie Mole.—From an iron column on the outer extremity of Marie Valerie Mole a fixed electric light with white and green sector is exhibited at an elevation of 35 feet above the sea, visible 1 mile.

A fixed green light is exhibited from the outer end of the new mole, 400 yards westward of Marie Valerie Mole, and should be seen from a distance of 1 mile; the light is unwatched. (See Light List.)

Rudolf Mole.—A fixed light, showing white and green sectors, is exhibited, at 35 feet above high water, from a lamp-post, 28 feet high, on the western outer end of Rudolf Mole.

(For the sectors of the light see Light List.)

A fixed white light is exhibited, at 35 feet above high water, from a lamp-post, 28 feet high, on the southeastern extremity of Rudolph mole.

Zichy Mole.—A fixed light, showing white and green sectors, is exhibited from each corner of the outer end of Zichy Mole. (For the sectors see Light List.)

Adamich Mole.—A fixed light, showing green seaward and white toward the land, is exhibited from the outer end of Adamich Mole.

Rudolf, Zichy, and Adamich Mole Lights are electric, and should be seen from the distance of 1 mile.

Gabriel Baross.—A flashing red light is exhibited at 52 feet above high water, from a gray iron pillar, surmounted by a red ball under the lantern, over a roundhouse, 53 feet high, on the western end of the outer mole; visible 5 miles.

Light buoy.—A light buoy, exhibiting a fixed white light, is moored about 200 yards eastward of the new mole, on the northern side of the entrance to the port. It is unreliable in bad weather.

Regulations.—Vessels entering or leaving Fiume or Gabriel Baross Harbor must proceed at a slow speed, and keep on the star-

board side of the fairway; those entering Gabriel Baross Harbor wait outside till those leaving are clear.

Torpedoes—Regulations.—Torpedo target rafts are moored on lines drawn 264° and 225° from the torpedo works. Those on the first bearing are moored at distances of 1,640, 2,188, 3,282, and 4,376 yards, and each is marked at night by a fixed white light, and at distances of 5,470 and 6,564 yards, each marked by two fixed white lights. Those on the second bearing are moored at distances of 3,282, 6,564, and 7,658 yards, and each is marked by two fixed white lights. In order to prevent collision between vessels navigating between Fiume and Volosca and Abbazia and torpedoes fired from the torpedo works, vessels must pass about 200 yards off Villa Petri, which is situated on the coast with Castua Church bearing 341° . Vessels from Abbazia toward Veglia Island must steer southward along the Istrian coast until past the electric central chimney, a distance of about 1,800 yards.

The firing of each torpedo is indicated by a long blast with a whistle or siren at the firing station. Should a torpedo deviate from its intended direction, short blasts will be sounded continuously with a more powerful whistle or siren until the torpedo stops.

Time signal.—On an iron framework erected on a low square tower situated near the middle of Maria Teresa Mole a black ball is hoisted 5 minutes before signal and dropped by electricity from the Naval Academy at the instant of noon mean time of the meridian of long. 15° E. corresponding to 23h. 0m. 0s. of Greenwich mean time; a gun is fired simultaneously. When signal fails in accuracy the ball is immediately hoisted halfway up and kept so for some time.

Port Martinscica, about $1\frac{1}{2}$ miles southeastward of Fiume (shown on the same chart), of which it is the quarantine port, is an inlet nearly 800 yards deep and about 300 yards wide; the soundings decrease from 17 fathoms at the entrance to 7 fathoms at its upper part. Vessels moor along the eastern shore on account of the bora. Small supplies may be obtained close to the beach. Shipbuilding is carried on here.

The entrance is easily recognized by the high point on the southern side and by a hill with a small chapel on its summit.

Directions—Anchorage.—There are no dangers in the approach to Fiume; vessels should not enter the port of Fiume at night without a pilot, but should bring up in the road. Large vessels should anchor off the port in a depth of from 20 to 24 fathoms, about $\frac{3}{4}$ mile from the town, good holding ground.

Although the fetch in the Gulf of Fiume is not more than 10 or 11 miles in any direction, a heavy sea is sent in by winds from the southward when they blow directly through the passage between Cherso and Veglia Islands.

Tides.—It is high water, full and change, at Fiume, at 8h. 28m.; springs rise 9 inches, neaps 6 inches.

Porto Re is about 6 miles southeastward of Fiume on the eastern side of, and in the entrance to Buccari Bay, just within Ostro Point. It is about 700 yards in extent and little more than 200 yards wide, and is sheltered from all but northwesterly winds, which send in a considerable sea; the depth in the middle is about 12 fathoms, mud, and good holding ground.

Ostro Point is surrounded by a rocky shoal extending about 200 yards. There is a mooring buoy a short distance within the entrance points. Water is with difficulty procured and provisions are scarce at the town, which is at the head of the port.

Lights.—On Ostro Point at the southwestern side of the entrance to Porto Re, is a circular lighthouse 46 feet in height and painted with red and white horizontal bands, from which is exhibited at an elevation of 50 feet above the sea a fixed and flashing white light, visible 12 miles.

Two small lights are shown from lamp-posts on the landing pier in Porto Re; one is fixed red, the other fixed green; they are elevated 13 feet above the sea and are visible 1 mile.

Telegraph.—There is a telegraph station at Porto Re.

Signal station.—There is a signal station on Ostro Point.

Supplies.—Provisions are plentiful. Water is said to be very good and is obtained free from the stream supplying the town.

Buccari Bay.—This bay would be more correctly described as a landlocked basin $2\frac{1}{2}$ miles in length northwest and southeast and from 500 to 900 yards in width; it is surrounded by bold shores and has depths of from 12 to 20 fathoms, with, consequently, accommodation for a considerable number of vessels of any size.

The town of Buccari, with a population of about 2,300, stands on the shore at the northwestern end of the bay and communicates with Fiume by a good road and also by railroad, the line from Fiume to Agram and Buda-Pesth passing inland at Buccari.

The village and bay of Buccarizza are at the southeastern end of the basin. The anchorage is off the town of Buccari, in 12 to 15 fathoms, mud, where vessels are best sheltered from the Bora, which at times reaches the anchorage suddenly and with great strength. Water is abundant and provisions may be obtained.

Mooring buoys.—A mooring buoy has been placed 400 yards southeastward of Buccari Harbor Light lamp-post. There is a mooring buoy off a small quay on the western shore about 1,067 yards 149° from the harbor light.

Harbor light.—A fixed red light, visible 2 miles, is shown from a lamp-post on a small mole at the northern side of Buccari Anchorage.

The fort on the southeastern side of the entrance to Buccari Bay, which also commands Porto Re, may be seen from a long distance. On the western shore of the approach to the entrance is a 5-fathom patch about 200 yards from the shore and 550 yards 245° from Sericca Point. The entrance to the bay is open to the southwestward, and, with the exception of the patch named, and of the shoal around Ostro Point on the opposite side, the entrance, which narrows at the inner points to 350 yards, is deep and the shores bold.

For the southern approach to Buccari Bay or to Fiume by the Maltempo Channel, see page 254.

Cherso Island.—The passage between this island and the coast of Istria is the widest of the Quarnero passages and is known as the great Quarnero Channel.

The Island of Cherso is 35 miles in length north and south, very irregular in shape, its greatest breadth near the middle being only $6\frac{1}{2}$ miles; from thence northward it narrows to $1\frac{1}{2}$ miles, becoming wider again toward the northern end. Its shores, except the northern portion, are somewhat broken, forming several small bays and inlets, as well as the large Bay of Cherso on the western side of the island; the coast is more or less high and rugged, but somewhat lower near the southern extremity. The eastern side has few inhabitants, and the extensive forests and barren wastes on that side are only occasionally interrupted by houses and patches of cultivated ground.

The western side has a less desolate appearance; toward the northern end it is high and studded with villages. The soundings are generally deep within 400 or 600 yards of the shore, and, except a few shoals presently described, there are no obstacles to navigation for vessels of deep draft. The highest point is Mount Syss, which rises 2,090 feet above the sea, near the narrowest part of the island, and about $6\frac{1}{2}$ miles from its northern end, while northward and southward of it are mountains of less height; in the center of the island is Mount Perska, 1,406 feet high, over the head of Cherso Bay; and, at the western foot of this mountain, in the middle of the island, is Lake Vrana, 3 miles in length and $\frac{3}{4}$ mile wide.

It is unadvisable to sail near the eastern shore of Cherso on account of the bora; the opposite side of the island is sheltered from this wind and has several ports and safe anchorages. Strangers may take warning of a coming bora by observing all the small craft hastening to the nearest places of shelter.

Bagna Cove—Tunny fishery.—Large tunny nets will extend about 1,200 yards seaward from the shore of Bagna Cove, which is situated on the northwest coast of the northern part of Cherso Island, from June until October, inclusive. Other nets will extend both ways at right angles to those extending seaward, so that

the whole will form a T. Two light buoys will mark the northern and southern extremities of the outer nets, and the vessel *Vedetta* will be moored about the middle of the outer nets.

Fishing is prohibited, except to the licensees, on the coast from Jablanac Point southwestward to Sterganac Point during the fishery.

Farasina—Telegraph cables.—The village and cove of Farasina are about 1 mile northward of Prestenizze Point, the western extremity of Cherso; the shore end of the telegraph cables, already mentioned, $\frac{1}{2}$ mile northward of this cove, is marked by a turret, and in Mazar Cove in Istria its shore end is similarly marked; other cables run from this landing place to Stupova Cove and to a spot midway between it and Mazar Cove; care should be taken not to foul them. A telegraph cable also connects the island of Cherso with Grego Morte Cove, Veglia Island, and another with the Island of Lussin.

Mooring buoy.—A mooring buoy has been placed in Farasina Cove.

Light.—On Prestenizze Point is a two-story building, 45 feet in height, from which is exhibited, at an elevation of 56 feet above the sea, an alternating fixed and flashing white and red light, visible 13 miles. This is the narrowest part of the channel leading to the Gulf of Fiume, Prestenizze Point being less than $2\frac{1}{2}$ miles from the coast of Istria.

Pernata Point is about 7 miles eastward of Nera Point on the coast of Istria and forms the western horn of Cherso Bay; it is bold, elevated, and one of the most remarkable points on the island, the land $1\frac{1}{2}$ miles southward of it being 1,116 feet high.

Zaglava Rock rises from a shoal nearly 400 yards in extent situated 2.1 miles 211° from Pernata Point and about $\frac{1}{2}$ mile from Cherso Island, with a depth of 30 fathoms between it and the shore and 7 fathoms $\frac{1}{2}$ mile southwestward of it.

Light.—On Zaglava Rock is a square light-tower above the light-keeper's two-story dwelling, 49 feet high, from which is exhibited, at an elevation of 65 feet above the sea, a fixed white light visible 14 miles.

Cherso Bay.—This bay is about $3\frac{1}{2}$ miles wide at its entrance between Pernata Point and San Biagio Point northeastward of it; from this line the bay extends southward nearly 5 miles and is protected from all but northerly winds. Vessels may anchor above the middle of the bay, at 400 yards or 600 yards from the eastern shore, in depths of 26 to 28 fathoms, good holding ground.

Port Cherso.—This inlet on the eastern shore of Cherso Bay is about 1.3 miles in extent, and, at about half way in, is 400 yards in breadth; it then expands, forming a basin 800 yards wide, which, though small, is an excellent port. The water at the entrance is

deep, but off the town of Cherso, on the northeastern side of the basin, it ranges from 8 to 10 fathoms, mud bottom. The best berth is abreast of the San Benedetto Convent southward of the town; small vessels anchor nearer the shore, to which they secure against the Bora.

A mole, about 166 yards in length, projects westward from the shore northward of the health office, alongside which there is reported to be a depth of 16 feet; a buoy lies off its extremity. There is a small natural basin, around which the town is built, capable of receiving small craft.

The town of Cherso contains a population of about 4,500. There is a spring of fresh water southeastward of the town and provisions are procurable. There are also yards for the repair of coasting vessels.

Lights.—At Kovacine or Zacca Point, on the northern side of entrance to Port Cherso, is an iron pillar on the extremity of a short mole from which is exhibited, at an elevation of 24 feet above the sea, a fixed white light, visible 10 miles. (Obscured sector, see Light List and chart.)

Molino Point.—A fixed red light is exhibited, at 18 feet above high water, from a red lamp-post, 16 feet high, on Molino Point. The light is visible 3 miles, and shows white towards the land, and is unwatched.

New molehead.—A fixed green light is exhibited, at 19 feet above high water, from a lamp-post, 16 feet high, on the new molehead at Cherso, and visible 2 miles. The light shows white toward the land and is unwatched.

Telegraph.—There is a telegraph station at Port Cherso.

Coast—Port San Martino is a bay 7 miles southward of Zaglava Lighthouse and open to the southward; a considerable swell sets in with southwesterly winds. The best anchorage for small vessels is in a depth of 10 to 13 feet, mud, abreast a monastery which is visible from some distance. The bay is somewhat protected from the southwestward by Levrera Island. The passage into Port San Martino northward of Levrera is about $1\frac{1}{2}$ miles wide and clear of danger.

Light.—A fixed red light, elevated 18 feet above the sea, is exhibited from the molehead at San Martino, and visible 5 miles. (See Light List.)

Levrera Island is about 2 miles in length north and south, $\frac{1}{2}$ mile in breadth, and, toward the southern end, 220 feet high. Both sides of the island are bordered by rocks and shallow water, which extend some distance offshore. Between it and the coast of Cherso is the small islet of Visoki, nearly round, 24 feet high, and, except on its northwestern side, surrounded by shallow water. About $\frac{1}{4}$ mile

northwestward of Visoki is a 7-fathom patch, and 1,650 yards northward of the islet a shoal with a depth of 5 fathoms.

Levrera Island Light.—A group flashing white light is exhibited, at 37 feet above high water, from a red conical turret with gallery, 25 feet high, on the west coast of Levrera Island about 800 yards from its southern end. The light is visible 11 miles and is unwatched. (See Light List.)

Ossero Channel is the space between the northeastern shore of Lussin Island and the coast of Cherso, which, northward of the narrows at Ossero, takes the name of Vier Bay. This bay affords good anchorage for vessels of any size in depths of 24 to 27 fathoms. The anchorage is 1 mile northward of the town, or farther southward, hard mud.

In entering Ossero Channel, the rock off Ossero Point, the northern extremity of Lussin, must be given a berth.

A beacon, painted white, surmounted by an open ball, 21 feet high, marks the northern end of the shoal off Ossero Point.

Ossero Channel leads to Lussin Channel.

The town of Ossero, ancient Absorus, stands on an eminence on Cherso Island close to Lussin Island, and an iron swing bridge connects the two. The channel between is named the Cavanella. It is only about 23 feet wide abreast the town of Ossero, with a depth of little more than 6 feet, but is available for small craft. A fort defends it. The two shores gradually diverge southward of the narrows to the southern entrance, which is about 3 miles wide. At Ossero the beautiful white limestone so largely employed at Venice is quarried. Water and provisions are scarce.

Telegraph.—Ossero is a telegraph station.

Light.—On the northern point of entrance to Ossero a fixed red light is exhibited at an elevation of 18 feet above the sea, visible 6 miles. (See Light List.)

Camisa Bay is in the northern approach to Ossero Channel, on the coast of Cherso and nearly 3 miles northward of Ossero Town. The water is deep, but there is anchorage for small vessels in the northern part of the bay in about 7 fathoms, muddy bottom.

Lussin Island—Aspect.—Lussin Island consists of mountainous heights united by low isthmuses and at a distance presents the appearance of three islands. It is $16\frac{1}{4}$ miles in length north-northwestward and south-southeastward, and its breadth varies from about $\frac{1}{2}$ mile to nearly 3 miles, its coast line being generally high, broken, and irregular and the water deep around it. The northern part is hilly and barren, and nearly 3 miles from this end is Mount Ossero, cone shaped and rising 1,920 feet above the sea. It is one of the most remarkable objects in this part of the Adriatic. Mount Calvario, 745 feet high, with a church on its summit, is in the south-

ern part of the island, which part is well cultivated and contains the greater portion of the population of the whole island. Here many flocks, the wool of which is exported, find pasture, and the vine and olive are grown in abundance.

Ossero Point, the northern extremity of Lussin Island, is mentioned above. The bold coast of the island from thence trends southward, with deep water off it, for nearly $7\frac{1}{2}$ miles to Carbarus Islet or Rock, which is connected with the shore by shallow water. From thence, southward around Gorila Point, the southwestern extremity of Lussin, it is bordered by a narrow bank. Bianca Point, 1 mile southeastward of Kurila Point, is bold, and $1\frac{1}{2}$ miles farther eastward is the entrance to Port Lussin Piccolo.

Port Lussin Piccolo is a long narrow inlet at the lowest and narrowest part of the island. The entrance, bearing about 65° distant 6 miles from the lighthouse on Sansego Island, is faced by Fort Asino (in ruins), on a hill 410 feet above the sea.

The port, about 600 yards wide, with depths of 11 to 18 fathoms in the entrance, extends nearly 3 miles northwest and southeast, has no hidden dangers, and is considered one of the best and most convenient harbors in the northern part of the Adriatic. Vessels anchor in any part of the inlet in depths of from 6 to 23 fathoms, good holding ground, but the northeastern side, not far from the outer houses of the town, is usually preferred on account of its being better sheltered from the bora. There is also anchorage in the northwestern part of the inlet. The rocky northeastern shore of Koludarc Islet and also the northeastern shore of the port abreast the outer houses of the town should not be approached too closely.

There are two mooring buoys on the eastern side of the harbor near the town, and three northwestward of the health office, inside which are eight mooring buoys for torpedo boats.

The town of Lussin Piccolo, at the southeastern end of the inlet, contains a population of about 5,000. There is very little cultivation in the vicinity, and what there is requires the protection of numerous stone walls, as the bora blows frequently with great violence during the winter months. There are building yards for small vessels, the wood being brought from the coast of Dalmatia and elsewhere.

Communication.—Steamers call three times a week with the mails to and from Trieste, Corfu, etc.

Supplies.—Water and small supplies of provisions may be obtained.

Telegraph cables.—The town is connected by telegraph cable with Sansego Island, Selve Island, and with Cherso, thence with the Istrian Peninsula.

A storm signal station is established on Mount Velo Straza, about $\frac{1}{4}$ mile northwestward of the town.

Time signal.—A time signal is made at the southwestern extremity of the quay fronting the square. It consists of two black disks hoisted vertically on a pole; these fall into a horizontal position at mean noon of the meridian of longitude 15° E., equivalent to 23h. 0m. 0s. Greenwich mean time. Signal not made on Sundays and holidays.

Lights.—At the western end of Mortar Islet, on the southern side of the Bocca Grande or passage into Port Lussin Piccolo, is a fixed white light with red sectors elevated 33 feet above the sea, exhibited from an iron column surmounted by a red and white globe, on the keeper's dwelling. The white light is visible 11 miles, and the red light at 8 miles. (For limits of sectors see Light List and Chart.)

Santa Croce Point.—An occulting green light is exhibited, at 31 feet above high water, from a red iron post, 28 feet high, on Santa Croce Point, the northern extremity of Koludarc Island. The light is visible 3 miles and is unwatched.

Poljana Point.—Two vertical fixed white lights are exhibited, 26 and 19 feet above the sea, respectively, from a red iron house with crane visible 7 miles.

Two fixed red lights are shown at the town of Lussin Piccolo, one at each end of the landing place; they are elevated 18 feet above the sea, and are visible 2 miles. (See Light List.)

Directions.—When bound to Lussin Piccolo, the lowest part of Lussin Island should be steered for, and, on a near approach, the town, which is on an eminence at the southeastern end of the port, will be plainly seen. The Bocca Grande, the channel between Zabodacki (65 feet high) and Mortar Islets, is free from dangers; the entrance to the port is about 400 yards wide between the bluff Torunza Point and the northwestern extremity of Koludarc Islet, both of which are foul to a short distance and should be rounded at the distance of 200 yards, after which a course may be steered direct for the town.

Mortar Islet is connected with Koludarc Islet by a bank covered with 1 to 2 fathoms water. The narrow space between the southeastern extremity of Koludarc Islet and the point of Lussin Island, which forms the port, is called the Bocca Falsa, or false entrance, and only admits boats, being closed by a reef of rocks.

Artatorre Cove.—Temporary anchorage may be obtained in Aratorre Cove on the northern side of Bocca Grande, when the bora prevents entrance to Lussin Piccolo. But care must be taken to quit it before being detained by southerly winds, to which it is quite exposed.

Port Cigale, situated 2 miles southward of the entrance to Port Lussin Piccolo, is a well-sheltered inlet about $\frac{1}{2}$ mile deep, frequented by coasting vessels; its entrance, which is not quite 300 yards wide, is between points Cigale and Madonna or Annunziata and is open to westerly winds. The depth is from 9 to 12 fathoms in the middle of the port. There is a health office here, and the distance across by land to Lussin Piccolo is only about $\frac{1}{2}$ mile. There is a chapel on Annunziata Point.

Lights.—A fixed red light is exhibited, at 188 feet above high water, from an iron standard 15 feet high, from the head of a new mole on the northern side of Port Cigale; visible 1 mile. The light is unwatched, and it is not exhibited during northwesterly gales.

At Madonna or Annunziata Point, on the southern side of entrance to Port Cigale, a fixed green light is exhibited from a green iron post, at an elevation of 35 feet above the sea, visible 5 miles. (See Light List.)

Unie Island is the westernmost of the Quarnero Islands; between it and the coast of Lussin is a deep channel from $2\frac{1}{4}$ to $3\frac{1}{2}$ miles wide. The island is 5 miles in length, north and south, from $\frac{1}{2}$ mile to $1\frac{1}{2}$ miles in width, and of irregular shape; its hills are from 312 to 453 feet above the sea, the highest being toward the southern end. The low parts of the island are covered with grass and brushwood.

The island has a population of about 700, produces good firewood, and has a considerable fishery.

Port Unie, on the western side of Unie Island, is about $\frac{1}{2}$ mile wide at the entrance, recedes about the same distance, is open to northwesterly winds, and affords temporary anchorage for moderate-sized vessels.

The best berth is in a depth of 9 fathoms, sand, northeastward of the islet off Nard Point, the southern point of the bay; here there is shelter from all easterly winds. The southern side of the bay is bordered by shoal water, which includes the islet and continues along the shore to Arbit Point, the southern extremity of the island, 500 yards off which there is a shoal marked by an iron beacon 15 feet high, surmounted by a white ball, in 7 feet water. At 100 yards all around this shoal there is a depth of 5 fathoms.

Light.—On Netak Point, the southwestern extremity of Unie Island and about 1 mile southward of Port Unie, is a white tower adjoining a dwelling, 44 feet in height, from which is exhibited at an elevation of 56 feet above the sea, a fixed light, with white and red sectors. The white light is visible 13 miles, red light at 7 miles. (For limits of sectors see Light List and chart.)

Telegraph.—There is a telegraph and signal station at Netak Point.

Anchorage.—There is good anchorage sheltered from northerly and easterly winds in Vrulje Bay on the southwestern side of Unie Island, in a depth of about 15 fathoms, with Netak Point Lighthouse bearing about 329° , 1,600 yards, and about the same distance from the eastern shore.

On the eastern side of Unie are three small bays, named Ports Lungo, Mezzo, and Fogon; they are exposed to southeasterly winds, which send in a considerable sea, but afford shelter against westerly and northwesterly winds.

Canidole Islands consist of two islands connected by a 3-fathom ridge, and together are $2\frac{1}{4}$ miles in length northwest and southeast and about 600 yards in width. The northern island, Great Canidole, is twice the length of the other and 197 feet high; Little Canidole is 157 feet high and has the small Silo Islet or rock about 400 yards off its southeastern end. The islands are partly wooded and the water is deep round them.

Channel.—They are separated from the southern end of Unie by a channel about 1,600 yards wide, with a depth of 12 fathoms in the middle. A vessel taking this channel should avoid the rock awash marked by beacon, nearly 400 yards from Arbit Point, the southern extremity of Unie, with a 5-fathoms patch outside it, by keeping nearer Great Canidole Island than the point.

Anchorage.—Shelter may be obtained from a bora a short distance southwestward of the Canidoles, in 20 to 22 fathoms, sandy bottom.

Silo Rock—Light.—A flashing white light is exhibited at 36 feet above high water, from a hexagonal stone tower, 33 feet high, on Silo Rock. The light is visible 9 miles and is unwatched.

Unie Channel.—The large and partially land-locked space between Unie and Lussin Islands affords a safe refuge to the numerous fishermen of this part of the Adriatic, who affirm that a large fleet might here ride out a gale of wind in complete security. The depths are very regular; from 24 to 26 fathoms, sand and mud.

Galiola Isle, situated 5 miles northwestward from the northern extremity of Unie Island, is a low rocky islet, surrounded by shoal water. On it is a white octagonal lighthouse 69 feet high, rising from the keeper's dwelling, which has a flat top.

Light.—From the lighthouse on Galiola Isle is exhibited, at an elevation of 68 feet above the sea, an alternating flashing white and red light. The white flashes should be seen from a distance of 14 miles, and the red flashes of 11 miles. (See Light List.)

Fog signal.—During thick or foggy weather a bell is sounded from the summit of the lighthouse for five seconds at intervals not exceeding one minute.

Sansego Island, is the southwesternmost of the Quarnero Islands; it is usually made by vessels on their way to sight Cape Promontore before proceeding northward. Mount Garbe, its highest point, is 321 feet above the sea, and is crowned by a lighthouse; the island appears flat at a distance, is about $1\frac{1}{4}$ miles long northwest and southeast, by 1 mile wide, and has a sandy soil.

The coast is steep and bold except at the point, near which the water is shallow; the island is somewhat in the form of a triangle with its shortest side to the southeast.

Rocky patches, with depths of 6 to 9 fathoms, lie from $\frac{1}{2}$ mile to nearly 2 miles from Vardicola Point, the northwestern end of the island, and, although the least known depth is 6 fathoms, it is advisable to keep clear of them to avoid the heavy sea which occasionally breaks. A rocky patch, with 11 fathoms, lies about 1,600 yards westward of Margarina Point, the southern extremity of the island.

Village.—On its eastern slope, near the middle, is the village with a church. It has a population of about 1,450; wine and fruit are the chief products.

Light.—A fixed and flashing white light is exhibited, at 357 feet above high water, from a square turret above a square dwelling, 40 feet high, on Mount Garbe, the highest point of Sansego Island, and should be seen from a distance of 20 miles. The light is obscured toward Netak Point, and in places by Lussin Island. (See Light List and chart.)

The lighthouse is connected by telephone.

Anchorage.—Vessels anchor 1,000 or 1,200 yards from the southwestern shore of the island in a depth of 19 fathoms, sandy bottom, with Sansego village bearing about 70° . This anchorage is useful in a Bora.

Dragazoul Cove or Sansego Harbor, suitable for small vessels only, is on the northeastern side of Sansego Island and is quite open in that direction. In entering the cove the ruins of an old breakwater must be avoided.

Harbor Light.—From the pier end in Dragazoul Cove, a fixed white light with red sector, visible 2 miles, is exhibited at an elevation of 19 feet above the sea. (For limits of sector see Light List.)

Mooring buoy.—There is a mooring buoy in Dragazoul Cove in 3 fathoms water.

Telegraph.—Sansego Island is connected with Lussin Piccolo by submarine telegraph, thence with the mainland.

Great Quarnero Channel.—This channel, formed by the eastern coast of Istria on the one hand, and by Cherso, Lussin, Unie, and Sansego Islands on the other, has a general depth of 27 to 30 fathoms,

and is of safe navigation with reference to rocks and shoals. The narrowest part, between Nera and Zaglava Lighthouse is $6\frac{1}{2}$ miles wide, and, at night, these lights, together with those of the Porer Rock, Galiola Islet, Unie Island, Netak Point, and Sansego, afford the seaman every facility for ascertaining his position. Northward of Nera and Zaglava Lighthouses the channel at first widens and then again contracts to the narrow pass known as the Farasina Channel.

The bora is often very violent and dangerous in the Great Quarnero Channel, and vessels are obliged to bear up for shelter under Cape Promontore or for one of the ports in the neighborhood; or, if necessary, to anchor at once wherever they may happen to be. This wind undergoes remarkable shifts; to the northward, it usually follows the direction of the channel; toward the middle it veers to the eastward, and it generally becomes northerly again as the shore of Cherso is approached.

The current is rapid in the narrowest part, in northerly winds, when it sometimes attains a speed of 4 miles an hour. During the flood, it sets northward along the coast of Cherso and southward along the shore of Istria; during the ebb, the direction throughout the channel is southerly.

Asinello Island, southeastward of Lussin, is about $2\frac{1}{2}$ miles in length, 1 mile in breadth, 298 feet high, and has an irregular shore; on its northeastern side is the village of San Pietro. The island of San Pietro di Nembo lying parallel with the northeastern shore of Asinello, together with the little isle Kosjak, 128 feet high, approach Lussin Island so closely as to leave a narrow 8-fathom channel only 200 yards wide between them. Radovan Point, the southeastern extremity of Asinello, is easily recognized, being long, low, and whitish. A mile westward of the point, a shoal with from 1 to 3 fathoms water projects from the shore.

Port San Pietro di Nembo is in fact the channel between the island of that name and Asinello. The port thus formed is narrow, being from 200 to 400 yards wide, but more than 1 mile in length, with from 2 to 5 fathoms water. It may be entered by small craft at either end, but the southeastern passage is the wider and better when the wind is favorable.

The best anchorage, fit only for small vessels, is in $3\frac{1}{2}$ fathoms abreast a ruined fort on the shore of San Pietro di Nembo. In taking the northwestern entrance, indicated by a church near some white cliffs on the eastern side, mid-channel should be preserved, when a depth of $2\frac{1}{2}$ to 2 fathoms may be maintained, but the water on both shores and in the channel is very shallow until past the village of San Pietro.

Water may be obtained at the village and also near the ruined fort.

The island of San Pietro di Nembo is bold, 206 feet high, more than 1 mile in length, woody, with a church near its northwestern end, which is a long $\frac{1}{2}$ mile from Lussin. Kosjak is divided from San Pietro di Nembo by a narrow $4\frac{1}{2}$ -fathom channel, but the current is too rapid to permit of either this or the passage between Kosjak and Lussin being taken without much caution.

Harbor Light.—At about 200 yards southeastward of the Health Office on San Pietro di Nembo Island, a fixed red light, elevated 19 feet above the sea, is exhibited, visible 3 miles; is unwatched. (See Light List.)

Gruica Islet.—This small islet lies 207° distant $1\frac{1}{2}$ miles from Radovan Point, Asinello, and has on it a one-story dwelling with lighthouse tower adjoining; it is bordered by a bank extending more than 200 yards northward.

Bank.—At 1,400 yards northward of the islet, between it and Asinello, is the center of Gruica Bank with $3\frac{1}{2}$ fathoms water; the bank is nearly 1 mile in extent within the 10-fathom curve, and elsewhere has from 7 to 9 fathoms. Between it and Asinello Island is another patch with $5\frac{1}{2}$ fathoms.

Light.—An alternating fixed and flashing white and red light, is exhibited at 56 feet above high water, from an octagonal tower, 42 feet high, with a white dwelling adjoining, on Gruica Islet, and should be seen from a distance of 13 miles. (See Light List.)

Selve channel.—The northern entrance of this channel between Gruica Islet and Lutostrak Islet off the northern end of Premuda Island, is $2\frac{1}{2}$ miles wide and clear of danger, except the Levante Bank with 5 fathoms water, which is very small and lies nearly $1\frac{1}{2}$ miles 115° from Gruica Islet; it may be avoided by keeping either side of the channel aboard.

Selve Bank—Beacon.—The Selve Bank is nearly $\frac{1}{2}$ mile in extent, with 1 fathom on the shoalest part, which part is marked by an iron staff surmounted by a skeleton ball and vane 13 feet above the sea. On other parts of the bank the depth is from 6 to 9 fathoms. The shoalest part lies 59° distant $3\frac{1}{2}$ miles from Gruica Lighthouse, and 340° from the western extremity of Selve Island, described elsewhere. (See index.)

Both the Levante and Selve Banks are in the fairway of the approach to the Quarnerolo Channel from the Selve Channel; Gruica Lighthouse, 247°, leads $\frac{1}{2}$ mile southward of Selve Bank.

Anchorage—The Great and Little Oriole, situated $\frac{1}{2}$ mile eastward of the southeastern extremity of Lussin, are two rocky islets nearly united and together not quite 2 miles in length; the Great Oriole is the northernmost of the two and is 91 feet high.

There is good anchorage between them and Lussin in a depth of 22 fathoms, mud and sand, sheltered from the Bora. Both the north-western and southeastern entrances are clear of danger. A rocky shoal, awash, lies nearly 600 yards eastward of the northern part of Little Oriole.

Lussin Channel.—The eastern coast of Lussin Island is irregular, mostly high, and, with the southern end of Cherso, forms the Lussin Channel. The two shores at the southeastern end of the channel are a little over 3 miles apart and gradually converge until, after a distance of 7 miles, as before described, abreast the town of Ossero, they approach each other so closely as to leave a channel only 25 feet wide. (See Ossero Channel.)

The water from the depth of 38 fathoms at the entrance, shoals gradually to the upper part of the channel, the bottom throughout being mud. The channel is too much exposed to southeasterly winds and sea for safe anchorage, but small vessels anchor at Martincica, Caldonte, Port Sonte, and other small places. The passage through the Cavanella, from the Lussin to the Ossero Channel is described elsewhere.

Light.—At Neresine on the western side of Lussin Channel, and about 1 mile southward of the entrance to Cavanella, a fixed green light is exhibited from the mole head, elevated 16 feet above the sea, and visible 2 miles.

Mooring buoy.—A mooring buoy has been placed off Neresine Harbor in $4\frac{1}{2}$ fathoms water.

San Martino Harbor—Mooring buoy.—A mooring buoy has been placed in San Martino Harbor in 14 fathoms water.

Darche Cove.—Anchorage is prohibited for 80 yards off the north-west shore of Darche Cove.

Port Rovenska.—Lussin Grande Village stands on a hillock, and points out the position of Port Rovenska, on the eastern coast about $2\frac{3}{4}$ miles from the southern end of Lussin Island; this small port is open to the north and has sufficient space for small vessels only. Northerly and easterly winds occasion a heavy sea at the entrance.

Lussin Grande—Light.—A fixed red light is exhibited, at 34 feet above high water, from a green lamp-post, 18 feet high, situated 18 yards within Cappellata Point, Lussin Grande, visible 3 miles. The light is unwatched. (See Light List.)

Mooring buoy.—A mooring buoy is placed off Lussin Grande Harbor in $2\frac{1}{2}$ fathoms water.

Port San Andrea—Light.—A fixed red light is exhibited, at 17 feet above high water, from a lamp-post, 15 feet high, on the mole-head. The light is visible 3 miles and unwatched, and is unreliable in heavy weather. (See Light List.)

Kraljetto Rock—Beacon.—An iron post, surmounted by a red mark, stands on Kraljetto Rock.

Croce Point.—The southern end of Cherso Island is about $2\frac{1}{2}$ miles across, and slopes gradually southward with a rugged and irregular coast line forming several small but deep inlets, the points being bordered by shallow water. Croce Point, the central projection, is low and is on the eastern side of Port San Andrea, the principal inlet, which alone has sufficient space for small vessels.

Oruda Island.—About 4 miles southeastward of Croce Point is the northern end of Oruda Island, about 1,400 yards in length and 46 feet high; beyond it is Palazzuol Islet. These are connected and surrounded by shallow water.

Beacon.—At 1 mile eastward of Palazzuol, is a sunken rock marked by an iron beacon surmounted by a skeleton ball. (Beacon destroyed, 1914.)

Wreck.—A steamer with masts above water lies sunk (1914) in the channel between Palazzuol Shoal, and the shoal 1 mile eastward.

Palazzuoli Bank.—Numerous shallow rocky patches extend 3 miles north-northwestward of Oruda Island, with deep water between them, and in the middle is the Kraljetto, a sunken rock.

Beacon and buoy.—An iron pole with an open ball topmark, elevated 19 feet above the sea, marks a rock with 4 feet water on the southwestern side of Palazzuoli Bank; from it the northern extremity of Oruda bears 107° , distant 2,200 yards.

A beacon buoy lies on the northern edge of the shoal patches described, the navigable channel lying between the buoy and Croce Point. The buoy is surmounted by an iron cage, painted white, and lies in 22 feet water, with Fort Asino bearing 257° and Terstenik Lighthouse 17° .

Terstenik Island, $\frac{3}{4}$ mile in length with a lighthouse 58 feet in height, on its highest part, is about $2\frac{1}{2}$ miles northeastward of Kolorat Point, Cherso Island.

A fixed white light, with a red sector, is exhibited at 87 feet above high water, from a stone octagonal tower, 58 feet high, with dwelling adjoining, on the middle of Terstenik Island; the white light should be seen from a distance of 15 miles, and the red light of 10 miles. (For the sectors of the light, see Light List and chart.)

The red sector shows in the direction of the navigable passage between the southern end of Cherso and the dangers extending northward from Oruda Island with not less than 5 fathoms water.

Eastern coast of Cherso.—At 5 miles northwestward of Terstenik Lighthouse, and 1 mile from the shore of Cherso, is the little islet of Cutin. Between the islet and the shore is a shoal with a depth of $3\frac{1}{2}$ fathoms; and $\frac{3}{4}$ mile from the shore, is a shoal $\frac{1}{2}$ mile in length,

with only 2 fathoms water. From thence northward along the eastern coast of Cherso, through Corsia and Veglia Channels, though there are no outlying dangers, there are no anchorages, and the whole of this coast being exposed to the Bora a near approach to it is to be avoided. With proper care the chart is sufficient guide.

Caisole Cove.—There is a small boat harbor at Caisole, on the eastern coast of Cherso, formed by a mole within which there is a depth of nearly 10 feet.

Light.—A fixed red light is exhibited, at 21 feet above high water, from a green lamp-post, 18 feet high, 15 feet within Caisole Mole-head, and should be seen from a distance of 4 miles. The light is unwatched, and can not be lighted during southeasterly gales. (See Light List.)

Veglia Island—General remarks.—Veglia is the most northern and the largest of the Quarnero Islands, somewhat triangular in form, 20 miles in length, with an extreme breadth of 11 miles, and of all the islands in the Austrian dominions is only second to Lissa in the number of its population, which is estimated at about 18,000, and it is superior to Lissa in the variety and abundance of its produce.

Of the various mountains, Orliach, 1,763 feet above the sea, and Triskovac, 1,775 feet, both in the southeastern end of the island, with Mount San Giorgio, 1,076 feet high, near the northeastern coast, are the most remarkable; the greatest heights being toward the southeastern end.

The southwestern part is lower and more fertile than the opposite side, but a great portion is covered with woods. The island is noted for a peculiar breed of small and active horses. The gentle slopes of the higher parts afford pasturage which is highly esteemed; the wine is the best produced in the Quarnero, and the olives and various fruits grow luxuriantly.

The northern coast is high, rugged, and of whitish appearance, except northwestward between Pelova Point and Sottile Point, Castelmuchio Bay, where patches of cultivation alternate with woodlands. The country in the neighborhood of the town of Veglia, on the southwestern side of the island, is well cultivated and of agreeable aspect, as is the southern coast generally; near the southeastern extremity it is rocky and barren.

Gallon Islet lies about $\frac{3}{4}$ mile off Cernika Point on the southwest coast of Veglia Island.

Light.—A flashing red light is exhibited, at 33 feet above high water, from a red conical turret, 31 feet high, on the northeast extremity of Gallon Islet. The light is unwatched and visible 5 miles.

Veglia Bay, situated near the middle of the southwestern coast, is $2\frac{1}{4}$ miles wide between the entrance points and nearly $1\frac{1}{2}$ miles deep; it affords anchorage for vessels of any size in depths of from 5 to 11 fathoms, muddy bottom. Bora squalls reach it from the elevated valleys of Mount Triskovac, and it is advisable to anchor under the southeastern shore of the bay, off Caneve Cove, and to take every precaution against this wind.

The port of Veglia, in the northwestern part of the bay, is merely a creek protected by a small mole, under cover of which large boats or crafts of very light draft lie well protected from southerly winds; the depth in the middle is little more than 6 feet.

Harbor works are in progress. A new mole is under construction in Veglia Harbor.

A pole marks the limits of the fill.

Vessels should not pass between this pole and the shore. At present (1913) the pole is not lighted.

The town of Veglia stands high, contains a population of about 1,700, has a cathedral and several other important buildings, and is defended by walls and a castle. Spring water may be obtained, and it is the chief place of export for the produce of the island.

Mooring buoy.—Outside the breakwater, in a depth of about 7 fathoms, is placed a mooring buoy, but it is only serviceable for small vessels in fine weather.

Telegraph cables.—The port of Veglia is a telegraph station, the island being connected by cable from Rebizza Point with the mainland at Spasovac, near Zengg, and with Cherso by cable from Grego Morte Cove, on the western side of Veglia, to the northern end of the Corsia Channel, both shore ends of this cable being marked by turrets. The island is also connected by cable with Arbe Island.

Lights.—On the molehead at Port Veglia is a small stone tower, from which is exhibited, at an elevation of 23 feet above the sea, a fixed white light, visible 6 miles.

A fixed green light is exhibited, at 15 feet above high water, from a green lamp-post, 15 feet high, on the north mole of Port Veglia. The light is unwatched and visible 2 miles.

Negritto Point.—At Negritto Point, the southeastern point of Veglia Bay, is a fixed red light elevated 42 feet above the sea, visible 5 miles. The light is exhibited from an iron framework attached to the keeper's white dwelling, which is close to the shore. (See Light List.)

Cassion Bay is a basin 1 mile long and 1,600 yards wide in the northeastern part of Veglia Bay; it is almost land-locked and is only frequented by small craft to load with firewood; the entrance has a depth of 9 feet, over a breadth of 54 yards. Stone conical beacons, 90 yards apart in a northwest and southeast direction, are erected

some 15 yards within the edges of the channel; the best water is mid-way between them.

Caution.—**Harbor works** and blasting operations close the entrance to Ponte Harbor, except for small vessels by day when there is no blasting going on. A red flag is hoisted on a scaffold in the entrance one hour before firing the mine. Vessels should anchor southward of the vertical green lights on the eastern side of the entrance to the bay (December, 1912).

Mooring buoy.—A mooring buoy is placed outside the entrance to Cassion Bay.

Lights.—Two fixed green lights placed vertically, 27 and 17 feet above the sea, and visible 3 miles, are exhibited from an iron crane on a stone pillar situated on the eastern side of the entrance to Cassion Bay. (See Light List.)

The coast between Veglia Bay and Suh Point forms the eastern shore of the Veglia Channel, $2\frac{1}{2}$ miles wide at its narrowest part, and is everywhere steep-to.

Plaunick Island, in southern approach to Veglia Channel, is about 3 miles in length, $1\frac{1}{4}$ miles in breadth, and 636 feet high. Its shores are generally bold with the exception of the southeastern end, where shallow water extends off more than $\frac{1}{2}$ mile, and beyond this again is Cormato Islet, 26 feet high, 1400 yards in length, and very narrow.

Corsia Channel.—Between Plaunick Island and the coast of Cherso on the west, is the Corsia Channel, clear of danger, deep, $\frac{1}{2}$ mile wide, and forming the connection between the Quarnerolo and Veglia Channels in steering by this route for the Gulf of Fiume.

Light.—On Crussia Point, the northwestern extremity of Plaunick Island, stands a white iron circular lighthouse on a masonry base 41 feet high, from which, at an elevation of 72 feet above the sea, is exhibited a fixed white light (unwatched), visible 8 miles.

Dangers.—The northeastern point of Plaunick Island is $1\frac{1}{4}$ mile from the nearest part of the coast of Veglia, and between them there are no dangers and the soundings are deep; but, between the island and Veglia Bay, and toward Negritto Point, are three shoals, viz, Pitic Bank with 2 fathoms water, about $\frac{3}{4}$ mile 11° from the southeastern end of Cormato Islet; Bondenegrutto Shoal with $3\frac{1}{2}$ fathoms, midway between Cormato Islet and Negritto Point; and, half way between Plaunick Island and the shore of Veglia Bay, in the middle of the entrance to that bay, is But Shoal with 4 fathoms. These dangers have deep water close around them and may be avoided by keeping the coast of Veglia aboard.

Light—Morganillo Point.—A group flashing white light is exhibited, at 39 feet above high water, from a conical white iron turret, 33 feet high, and visible 9 miles; it is unwatched. (See Light List.)

Cavlena Bay.—Vessels may anchor in Cavlena Bay on the north-western coast of Veglia, northward of Suh Point, or Santa Maria Point, as it is sometimes called from the monastery of Santa Maria di Capo, which is built on the point. Large vessels should anchor about 800 yards from the shore, in a depth of 25 fathoms, good holding ground. This anchorage is well protected by Cherso Island from southwesterly winds and is exposed only to those from northward or westward.

Malinska Road is close eastward of Pelova Point, which point separates this road from Cavlena Anchorage. Vessels of deep draft anchor in a depth of 19 fathoms, mud, between two small creeks protected by moles, one on each side of the bay, and about 600 or 800 yards from the shore. Smaller vessels, drawing too much water to haul inside the moles, anchor nearer the beach. There is a mooring buoy westward of Malinska Lighthouse. Northwestern winds are troublesome, but although they sometimes occasion a considerable sea they are not dangerous at this anchorage. Water may be obtained at Malinska Village.

Beacon.—The sand bank on the southwestern side of the entrance to Port Malinska is marked by an iron post, painted black and white, and surmounted by two disks. (See Light List.)

Light.—A fixed red light is exhibited from a lamp-post on the mole head at Malinska; it is elevated 19 feet above the sea and visible 8 miles.

Sasso Bianco Road, 2 miles northward of Malinska, is also exposed to northwesterly and southwesterly winds. The anchorage is in a depth of about 10 fathoms, muddy bottom, abreast the small village Njivice.

The high, rounded, and wooded Pelova Point is a good mark for both Sasso Bianco and Malinska Road.

Castelmuschio Bay, near the northern extremity of Veglia, is protected by the low narrow peninsula terminating in Sottile Point, which, projecting $1\frac{1}{2}$ miles northward, forms its western side. It is $\frac{1}{2}$ mile wide and has a depth of 29 fathoms in the middle of its entrance, which decreases to 14 fathoms opposite the village at the head of the bay; on the eastern side, the space is sufficient for a number of vessels of the largest size, but the Bora is sometimes severely felt at this anchorage.

A shoal extends northward from Sottile Point, on the western side, which should not be passed within 400 yards. Both points of the bay eastward of Castelmuschio are bordered by reefs and should not be approached too closely.

About $\frac{1}{2}$ mile within Kiac Point on the eastern side of the entrance to Castelmuschio Bay is Port Lucizza, which is preferred by small

vessels to a position higher up the bay; the anchorage in this port is in about 7 fathoms, securing to the shore against the Bora.

Water and small supplies of provisions may be procured in Castelmuschio Bay.

Mooring buoys.—Two mooring buoys are placed in the inner part of the bay about 65 yards offshore.

San Marco Islet is a barren rocky islet 342 feet high, close to the northern extremity of Veglia Island; it divides into two channels the entrance to the Maltempo Channel, between Veglia and the Croatian coast. The southwestern one, between San Marco and Veglia, is too narrow except for small vessels under favorable circumstances; that between the islet and the coast is about $\frac{1}{4}$ mile wide, with depths of from 32 to 9 fathoms, and has no hidden dangers.

Light.—From an iron conical turret, painted red, with stone base, situated 24 yards within the northeastern point of San Marco Islet, a fixed white light (unwatched) is exhibited at an elevation of 49 feet above the sea, visible 8 miles.

Anchorage.—There is a depth of 7 fathoms, mud, in a little bay between San Marco Islet and a small rocky peninsula near the northern extremity of Veglia. Vessels anchor in the center of the bay and lay out a cable to the peninsula, where is the village and church of Voos. This anchorage is useful to vessels overtaken by a Bora after entering the Maltempo Channel from the westward.

Maltempo and Morlacca Channels.—Maltempo Channel is formed by the coast of the mainland southward of Porto Re on the one side, and the island of Veglia on the other, and is the northern portion or continuation of the Morlacca Channel, described elsewhere. It derives its name from the fury with which it is assailed by bora gales. It has deep water, is very narrow and winding between San Marco Islet and the mainland and for 4 or 5 miles to the southeastward, the currents are always rapid, and the only shelter is in some coves on the Croatian shore. The following three lights assist the navigation of these narrows:

Lights.—At Dubno Point, on the mainland eastward of San Marco Islet, a fixed red light, visible 2 miles, is exhibited from an iron crane over a shed, at an elevation of 79 feet above the sea.

At Voschizza Point, Veglia Island, a fixed white light, visible 8 miles, is exhibited from an octagonal stone turret attached to a dwelling house, at an elevation of 39 feet above the sea.

At Ertac Point, on the mainland, a fixed green light, visible 2 miles, and elevated 29 feet above the sea, is shown from an iron crane attached to a dwelling. (See Light List.)

Coast.—Between Porto Re and port Segna or Zengg, 23 miles southeastward of the former, the coast of Croatia is barren and pre-

cipitous; the town of Novi, about 10 miles northward of Segna, being the only remarkable object.

Dobrigno Bay on the northeastern coast of Veglia, and about 6 miles from its northern extremity, affords excellent shelter for vessels drawing less than 12 feet, which is the general depth in the bay. A shoal covered with 6 feet water, which should be carefully avoided, lies about $\frac{1}{4}$ mile outside the northern point of entrance.

A bank, about 220 yards in diameter, with a depth of 1 fathom at its middle part, is situated 1,350 yards 282° from the lighthouse at the entrance of the bay.

Light.—On the southern side of entrance to Dobrigo Bay, a fixed white light, elevated 29 feet above the sea, is shown from a masonry tower with gallery, visible 5 miles.

Stipana Bay.—The northeastern coast of Veglia is swept by the Bora, and, although there are several small indentations called ports, Stipana Bay is the only refuge from this wind for any other than vessels of very light draft. It is about $1\frac{1}{2}$ miles southeastward of Dobrigno Bay, and is protected by the long narrow tongue of land forming Sillo Point. It is advisable to anchor in a depth of from 15 to 17 fathoms, mud, near the eastern side of the bay, with a cable to the shore northeastward. Sillo Point is foul, and, $\frac{1}{2}$ mile southward of it, a shoal with $2\frac{1}{4}$ fathoms water extends $\frac{1}{4}$ mile off-shore.

Light.—A fixed red light is exhibited, at 19 feet above high water, from a green lamp-post, 15 feet high, on Port Sillo Molehead, visible 3 miles. The light is unwatched, and is unreliable during northeasterly gales. (See Light List.)

Lights.—The following lights are shown at this part of the Maltempo and Morlacca Channels, all but that of Verbenico being on the shore of the mainland:

Crkvenica.—On the head of the southern mole at Crkvenica, a fixed red light is exhibited, elevated 20 feet above the sea, and visible 4 miles.

The entrance to Port Crkvenica is marked by several buoys. Dredging is being carried out in the harbor, which is to have a depth of 13 feet throughout.

Selce.—A fixed white light, visible 12 miles, is exhibited on the point southward of Selce Cove, at an elevation of 41 feet above the sea, from an iron post on the keeper's dwelling.

A fixed green light, elevated 14 feet above the sea, visible 2 miles, is shown from the pierhead at Selce.

Novi.—At the little port of Novi a fixed red light, elevated 19 feet above the sea, visible 2 miles, is shown from an iron crane over a shed on the South Molehead.

A fixed white light, elevated 11 feet above the sea, visible 2 miles, is shown from an iron lamp-post on the Inner Molehead.

Verbenico.—From the molehead of this port, on the eastern coast of Veglia, a fixed white light is exhibited, elevated 17 feet above the sea, visible 5 miles. Temporarily discontinued.

Mooring buoy.—A mooring buoy is placed in about 14 fathoms water off Crkvenica Harbor.

Telegraph.—There is a telegraph station at Verbenico.

Sezza Island.—This little island, steep to all round, lies in the fairway of the Morlacca Channel, 1 mile from the coast of Veglia, and $2\frac{1}{2}$ miles 278° from the South Molehead at Segna.

Bescanuova Bay, at the southeastern extremity of Veglia, is completely exposed to southeasterly winds and is seldom visited except by small coasting vessels and boats for water and vegetables, of which there is an abundant supply.

A mole, about 280 yards in length, northeast and southwest, projects from the shore about half way between the town of Bescanuova and Kricin Point. The land in the vicinity of the village is highly cultivated. A shoal awash extends 200 yards off-shore from Point Skuliza, the southern point of the bay.

Light.—From an iron support over a small red structure on Bescanuova Molehead, at an elevation of 33 feet above the sea, a fixed green light is exhibited, visible 2 miles. (See Light List.)

Telegraph.—There is a telegraph station at Bescanuova town.

Pervicchio Island, situated with its northern extremity about $\frac{1}{2}$ mile from the southeastern end of Veglia, is $4\frac{1}{2}$ miles in length northwest and southeast, $1\frac{1}{2}$ miles in breadth, 1,191 feet high, hilly, and barren; the Niviza Rock and a rocky shoal extend about $\frac{1}{4}$ mile offshore from the middle of the western side.

The channel between Pervicchio and Veglia, named the Bocca di Segna, is used by vessels bound to Port Segna on the coast of Croatia. Mid-channel should be preserved, as shoals extend from the two points of the islands which are nearest each other.

The bora often blows through this passage with considerable violence, and it is advisable to reduce sail before entering and to seek shelter under the lee of Veglia Island at the least indication of this wind approaching.

Light.—On Maistro Point, the northwestern extremity of Pervicchio Island, is a dwelling of reddish stone one story high from a stone turret above which is exhibited at an elevation of 75 feet above the sea a fixed white light, visible 11 miles.

Port Segna, or Zengg, situated on the mainland opposite the southeastern part of Veglia, where the Morlacca Channel is 3.2 miles wide, is formed by two moles, the Maria Art Mole projecting in a northerly direction (with defensive works to extend westward about 55 yards from it, under construction) from the southwestern point of the bay; and the San Ambros Mole from the northern Point

in a southwesterly direction. The moleheads are 300 yards apart northeast and southwest from each other. Midway between, from the center of the town, projects a third or harbor mole; off it and nearly in line between the outer moleheads is a mooring buoy. There is also a small wooden pier on masonry supports, with a depth of 11 feet at its outer end, in front of the bishop's palace.

The harbor is protected from southerly winds by the southern point, but is exposed to northwesterly winds. Every precaution should be taken against the bora, which is severely felt here; the holding ground is not good and anchorage under Arbe Island is preferable to exposure to bora gales at Zengg. It often happens that while a heavy bora is blowing at Zengg, a calm or light breeze prevails 5 or 6 miles seaward.

The town of Zengg or Segna, which is close to the shore, is partly built on the hilly point which juts out westward, and is commanded by a large fort 280 feet above the sea. It is one of the least frequented commercial places of Croatia and has a population of about 3,200. Building timber from Croatian forests and tobacco are exported.

Supplies.—Water, provisions, and materials for slight repairs are procurable.

Telegraph cable.—There is a telegraph station at Zengg in connection with the cable which is laid from Spasovac Cove, about 1½ miles southward of Zengg, to Rebizza Point in Veglia Island.

Tides.—It is high water, full and change, at Zengg at 8h. 25m.; rise 1½ feet.

Lights.—At San Ambros Molehead, from an iron support above the keeper's dwelling, and at an elevation of 27 feet above the sea, is exhibited a fixed white light, visible 10 miles.

Maria Art Mole.—From an iron crane over a shed, on Maria Art Molehead, a fixed red light is exhibited, elevated 17 feet above the sea, and visible 4 miles. It can not be shown during heavy weather.

Central Mole.—Two small fixed green horizontal lights, elevated 15 feet above the sea, visible about 1 mile, are exhibited from iron supports on stone bollards at the harbor molehead. (For arc of visibility see Light List.)

Directions.—There are no dangers in the approach to Port Segna. By night, vessels from the southeastward should sight the green lights on the central mole, between the red and white lights on the outer moleheads before entering the port.

Morlacca Channel, the continuation of the Maltempo Channel from the northward, embraces the coast and islands bordering it as far southward as the Montagna Channel leading to the Mare di Novegrad.

The long chain of high mountains rising about $\frac{1}{4}$ mile from the sea, occasions violent bora squalls, which render the navigation dangerous, especially as the channel affords scarcely any tolerable anchorage. The coasting vessels which use it on their way to Zengg, Carlopago, and Novegrad keep close to the shore, so as to be within reach of the various coves and creeks in it, and never remain under way at night during the bad season.

For the course or trend of the channel and the positions of the very few outlying dangers, reference should be made to the chart.

San Giorgio, Molini Cove, and Lukovo.—Between Zengg and Carlopago the coast is steep, rocky, and affords but little shelter. Small vessels anchor at San Giorgio nearly 4 miles southward of Zengg, where there is a short mole; also in Molini Cove, $1\frac{1}{2}$ miles southward of San Giorgio, which is open to the northward and has a 6-foot shoal in the entrance, situated $\frac{1}{2}$ mile northward of Molino Point.

Beacon.—The above shoal is marked by a cone-shaped stone beacon 6 feet high; the passage between the beacon and point is free from danger.

Shelter will also be obtained abreast the town of Lukovo, about 8 miles southward of Port Zengg, where there is a small bay open to the northward; the anchorage is about 200 yards from the shore, to which it is customary to make fast. Water may be obtained from a fountain close to the shore about 1 mile northward of the anchorage.

Light.—From an iron support on the molehead at San Giorgio, at an elevation of 21 feet above the sea, a fixed white light is exhibited, visible in clear weather from a distance of 6 miles. (For arc of visibility, see Light List.

Gregorio Islet, 2 miles southwestward from Pervicchio Island, is barren, $2\frac{1}{4}$ miles in length, 760 feet high, and steep-sided. In case of emergency, a vessel may anchor, sheltered from easterly winds, in Gregorio Bay on the northwestern side, in a depth of about 16 fathoms, muddy bottom.

Goli Islet, nearly 1 mile southeastward of Gregorio, is $1\frac{1}{2}$ miles in length and 760 feet high. Shoal water extends some distance from its northwestern point, and Mali Goli Islet, rocks, and shallow water, extend $\frac{1}{2}$ mile off from its southern point. A vessel may anchor southward of Goli and close to the mainland during a Bora.

Arbe Island.—This island is nearly 12 miles in length and varies in width from $1\frac{1}{2}$ miles at its southern part to about 6 miles at the northern; the coast line of this latter part is irregular and has deep indentations. A chain of hills, of which the highest, Mount Tinjarossa, is 1,338 feet above the sea and near the center, extends throughout the entire length of the island from northwest to southeast.

The population is about 4,500, and it is one of the most important of the Quarnero Group. The products are wheat, wine, olives, silk, and firewood, and a great number of sheep and cattle are reared; there are also marble quarries. Excellent wine is produced at Barbato, near the southwestern end of the island.

Telegraph cables.—Arbe is connected with Veglia by a telegraph cable which leaves the shore of Arbe at Point Stojan and is landed near Pago at the southern point of Veglia, at the western entrance to the Bocca di Segna. Ferkanjo Point, Port Arbe, is also connected with San Martino, Pago Island, by telegraph cable.

Port Arbe, at about the middle of the southwestern coast, is nearly 500 yards in length and rather less than 200 yards in breadth, with 3 to 12 feet water, and is sheltered from all winds by a mole extending southwestward from the eastern shore. The entrance to the port is between the town and Tонера Islet 300 yards southeastward of it.

The town of Arbe, with a population of 750, is pleasantly situated on the little projection which forms the southwestern side of the port. It is the center of the commerce of the island and contains a cathedral and a collegiate church. In the neighborhood are some salt works.

Tонера Islet is 200 yards in extent, 31 feet high, and connected with the main by shallow water. A breakwater, 6 feet in width and 6 feet above the sea, projects eastward from the islet toward the end of a similar breakwater extending from the shore and leaving an opening 20 feet wide for boats.

Eufemia Cove.—A tongue of land terminating in Ferkanjo Point, westward of the town, projects southeastward parallel with the shore and forms the narrow inlet named Eufemia Cove, more than 1 mile deep. Here there is a well-sheltered anchorage 1,400 yards in extent northwestward and southeastward by 450 yards in width, with depths of from 4 to 15 fathoms, muddy bottom.

Lights—Tonera.—On the northern extremity of Tонера Islet, from a green iron column 15 feet high, a fixed red light is exhibited at an elevation of 40 feet above the sea, visible 4 miles.

A small fixed green light, elevated 13 feet above the sea, is shown from the molehead at the entrance of the port, visible 1 mile.

On Ferkanjo Point a fixed green light, elevated 16 feet above the sea, is exhibited from an iron support, visible 2 miles.

Shoals—Beacons.—On Garofolin Rock, 350 yards southeastward of Ferkanjo Point, is a beacon consisting of an iron pole, surmounted with an openwork ball, elevated 21 feet above the sea. It is liable to be washed away.

A shoal with 2 fathoms lies between Garofolin Rock and Dolin Island.

Dolin Island is a long narrow strip running parallel with the southwestern coast of Arbe Island for about 5 miles, the space between forming the Barbato Channel. Dolin Island is 173 feet high at the northwestern end, 384 feet high at the southeastern end, and in no part more than $\frac{1}{2}$ mile wide. It is thickly covered with bushes. The approach to Port Arbe is between its northwestern end and Ferkanjo Point.

Barbato Channel.—This long channel between the shores of Dolin and Arbe Islands has an average width of about 400 yards, and the depth in the middle varies from 7 to 13 fathoms, sand. The bottom near Dolin is rocky. It affords excellent well-sheltered anchorage for a considerable number of vessels in three places, viz, about 1,400 yards within the northwestern entrance, where, abreast the small bay of Santa Lucia, is the widest part of the channel: a little southeastward of the small church of San Stefano, where the shore of Arbe is bordered by a sand bank; and about 2 miles from the southeastern end of Dolin Island. It is customary to anchor midway between the two shores and to lay out a cable to the northeastern shore.

There is a fountain with an abundant supply of water a short distance eastward of San Stefano Church.

Directions.—The approach to Port Arbe is between Ferkanjo Point and Dolin Point, 1,500 yards apart, the passage either to Port Arbe or to the other anchorages named lying between these two points. Ferkanjo Point should not be approached too closely in a vessel of deep draft. The deepest water between the Garofolin Rock Beacon and Ferkanjo Point is about 13 fathoms in mid-channel or rather nearer the shoal. Between this beacon and the northwestern end of Dolin Island is a 2-fathom patch, before mentioned. The water between these dangers and near Dolin Point is deep.

In taking the southeastern entrance to the Barbato Channel, the Cantarara Rocks, extending 300 yards from the southeastern end of Dolin Island, must be avoided; and Poklib Rock, united to Arbe by a rocky 4-fathom ledge, must be left on the starboard hand.

Arbe, east coast—Glavina Bank, lying about 400 yards off Glavina Point, the southeastern extremity of Arbe, has a general depth of $2\frac{1}{2}$ fathoms, with a rock having less than 6 feet water at its northwestern edge; a beacon 16 feet high marks this rock, consisting of an iron pole with openwork ball on top. The southern extremity of the bank is $\frac{1}{2}$ mile from the point, but there is a channel about 200 yards in width between the beacon and the shore.

Port Omago is a small inlet, open to the north, at the eastern extremity of Arbe Island; it affords a convenient shelter to small vessels overtaken by a bora in the Morlacca Channel. Rocks above water extend about 250 yards northward from the point of entrance,

and about $\frac{1}{2}$ mile farther northward is the islet of Lukovaz, $\frac{1}{4}$ mile from the shore, with shallow water extending from its northern end.

In the port the depth is from 7 to 9 fathoms, muddy bottom.

Bilibrach Shoal.—This shoal, with a depth of $5\frac{1}{2}$ fathoms, lies $1\frac{1}{2}$ miles 337° from Lukovaz Islet and is rather more than $\frac{1}{2}$ mile from the coast of Arbe Island. The eastern extremity of Arbe Island kept open eastward of Lukovaz leads eastward of it.

Coast.—From Port Omago, the northeastern side of Arbe Island is nearly straight in a northwest direction and is an exposed iron-bound coast until near its northwestern end, when it first trends eastward, forming Cernica Bay, and then round by north and west to its termination. From Cernica Bay the coast is broken and irregular, bordered here and there by shallow water and rocks, leaving between it and Gregorio Islet a deep passage 600 or 800 yards wide, but seldom or never used.

Arbe, northwest coast.—In the northwestern end of Arbe Island are three deep inlets or bays, viz, Loparo Bay, the most northern; Port San Pietro, in the center; and Kampora Bay, the most western.

Loparo Bay, the northern inlet at the northwestern end of Arbe Island, is shoal at its eastern side and at its head; it is open to the northwestward and is not a convenient anchorage.

Vela Rock, at the northeastern point of entrance to Loparo Bay, is marked by an iron beacon, surmounted by an open ball elevated 11 feet above the sea. Pregeba Bank extends some distance northward of the beacon, which must therefore be given a wide berth.

Port San Pietro, the central inlet, is also open to the northwest, but otherwise is well sheltered from all winds, and has depths of from 12 to 14 fathoms abreast of the health office on the northeastern side at a convenient distance from the shore for laying a cable to it. The shore of Mount Sorinja should be closed on entering this anchorage, and the southwestern side of the bay, which is bordered by shoal water, should be avoided. There are two good springs close to the beach.

Sorinja Bank.—At 800 yards off Sorinja Point, the northwestern extremity of Arbe Island, is Sorinja Bank, a 4-fathom rocky patch, with deep water between it and the point.

Kampora Bay, the western inlet, is southwestward of Port San Pietro, to which it is inferior as an anchorage. The best anchorage is in a depth of 10 or 11 fathoms, mud, off the village, which is on an eminence on the port hand in entering. The northeastern side of the bay should not be closed in the outer part, as there is a rock awash and the shore is bordered by shoal water.

Light—Cape Fronte.—On the southwestern point of Cape Fronte a fixed red light (unwatched) is exhibited from an iron tower, at an elevation of 34 feet above the sea, visible 4 miles.

Anchorage.—Between Cape Fronte on the western side of the island and the Port of Arbe, the coast is broken and has several coves where coasting vessels load with firewood sheltered from the bora. These places are also resorted to for temporary refuge by ordinary merchant vessels. There are one or two patches near the shore, with 3 to 4 fathoms water, which may be avoided by reference to the chart.

Laganj and Dolfin Islets, situated $4\frac{1}{2}$ miles westward of Port Arbe, are two barren islets 1.3 miles apart, each about half a mile in extent; they are almost connected by rocky shoals, and together extend over a space of about $2\frac{1}{2}$ miles.

Laganj, the northern islet, is 23 feet high; a rock or smaller islet lies off its southern end, and banks with from 6 to 10 fathoms water extend from it about 1.7 miles in a north-northwestward direction.

Dolfin Islet is 75 feet high; it has a rock awash off its northern end and a large rock off its southern end, where the islet is surrounded by a bank with from $5\frac{1}{2}$ to 10 fathoms water. Small vessels anchor for temporary refuge against a bora about 400 yards from the southwestern side of Dolfin Islet.

San Cristoforo Cove—Light.—A fixed white light is exhibited, at 21 feet above high water, from an iron lamp-post, 18 feet high, on the northwestern side of the entrance to San Cristoforo Cove, situated about $2\frac{1}{2}$ miles southeastward of Cape Fronte, Arbe Island, and should be seen from a distance of 5 miles. The light is unwatched.

Light.—A group flashing white light, with a red sector is exhibited, at 106 feet above high water, from a white iron turret, 34 feet high, on the summit of Dolfin Islet; the white light is visible 12 miles, and the red 8 miles. The light is unwatched. For the arc of the red sector, which shows over Laganj Island and the shoals northwestward of it, see Light List and Chart.

Quarnerolo Channel—General remarks.—This channel is bounded on the north by Veglia and Plaunick Islands; on the west by Cherso, Lussin, Asinello, etc.; and, on the east, by the several islands bordering the mainland. The general depth in the channel is from 40 to 50 fathoms. The chief and most frequented of the southern entrances to it from the open sea, is that between Asinello on the north, and Premuda and Selve Islands on the south; the second in importance is that between Selve and Ulbo; and, the next, that between Ulbo and Pago Islands, which last is taken by vessels bound to the Zara Channel.

Lutostrak Islet, is about $\frac{1}{4}$ mile in diameter and 86 feet high; it lies about 1 mile off the northern end of Premuda Island and is the southern boundary of the principal passage leading from the open sea to the Quarnerolo Channel. It is bordered by a narrow bank, which, on the western side, extends nearly $\frac{1}{4}$ mile from it.

The passage between Lutostrak Islet and Gruica Lighthouse, on the north, is about 2.6 miles wide; a short mile northwestward from the islet is an 8-fathoms patch with 20 fathoms close to it. North-eastward of this patch and 2.3 miles 28° from Lutostrak Islet, is the Levante Bank with 5 fathoms. To pass southward of this bank, keep toward Gruica Island or Lutostrak; Morovnik Islet shut in with the northern extremity of Selve Island until Gruica Lighthouse bears 295° leads southward of it. The Morovnik Bank, farther eastward, is 7 miles 70° from Gruica Lighthouse; when near it at night, keep the light clear of this bearing. (See Gruica Light and Selve Bank.)

Between Lutostrak Islet and the northwestern horn of Premuda Island, is Kamenjak, a smaller but rather higher islet than Lutostrak, it being 93 feet high. There are depths of from 6 to 23 fathoms between the two islets, and 4 fathoms between Kamenjak and Premuda.

Kamenjak Islet Light.—A flashing white light is exhibited at 39 feet above high water from a small red iron tower, 28 feet high, on the northern end of Kamenjak Islet. The light, visible 8 miles, is unwatched and is partially obscured from northward and southward by Lutostrak and Kamenjak Islets. (See Light List.)

Premuda Island is about 4.6 miles in length, $\frac{3}{4}$ mile across, and its greatest height, near the middle, is 295 feet; it is thickly covered with bushes except in the neighborhood of the town, which is toward the northwestern end on the slope of the highest hill; it contains a population of about 1,500.

The northeastern coast is precipitous, affords no shelter, and the water is deep throughout. The northern end, with the islet of Kamenjak on the west and Medvjak Point on the east, forms a bay, but the latter point is foul for about 400 yards in a north-northwestward direction.

Anchorage.—Vessels of any size may anchor during a Bora under the southwestern side of Premuda Island. Large vessels should anchor in about 33 fathoms, sand, nearly 2 miles from the shore, off the middle of the island; in Port Premuda the bottom is mud.

Light.—A fixed red light is exhibited, at 21 feet above high water, from a green lamp-post, 15 feet high, on the shore of Loza Bay, which is situated on the northeast coast of Premuda Island, about 1,600 yards southeastward of Medvjak Point, and visible 3 miles. The light is unwatched. (See Light List.)

Ports Kreul and Premuda.—The four small islets, Bracic, Plika, Massarine, and Kripa, ranging from 9 to 28 feet in height, with some rocks connecting them, extending nearly $1\frac{1}{4}$ miles parallel with the western side of Premuda, at about 400 yards from the shore, forming with it the channel named Port Kreul, in which small vessels

anchor in 2 to 4 fathoms, mud, abreast San Ciriaco Chapel, which is easily distinguished from the offing. With southeasterly winds the current sets rapidly through this channel and between the rocks. There is also anchorage for small vessels with offshore winds in Port Premuda, a small bay southeastward of Port Kreul.

Port Kreul Light.—A fixed red light is exhibited, at 20 feet above high water, from a green lamp-post, 18 feet high, on the northern molehead at Port Kreul and visible 4 miles. The light is unwatched.

Vodenjak Island Light.—A flashing white light is exhibited, at 29 feet above high water, from a red square tower with a gallery, 23 feet high, on the northern shore of Vodenjak Island off the southwestern side of Isto Island, and visible 9 miles. The light is unwatched. (See Light List.)

Skarda Island is 2 miles in length, rocky, barren, and covered with bushes; the most elevated part is a hill 356 feet high near the southeastern extremity. The island is connected with the southeastern end of Premuda by a ridge with $5\frac{1}{2}$ to 10 fathoms water. The channel between them is 1 mile wide, but is frequently difficult owing to the rapidity of the current over the ridge, the water being 30 fathoms deep on either side of it. Mid-channel should be preserved, as the opposite points of the two islands are foul.

A shoal with $3\frac{1}{2}$ fathoms lies 211° distant 1,600 yards from Suba Point, the northwestern extremity of Skarda, and a $4\frac{1}{2}$ -fathom patch 600 yards from its southern point.

Isto Island, nearly $\frac{1}{2}$ mile southeastward of Skarda, is $2\frac{1}{2}$ miles in length, $1\frac{1}{2}$ miles in breadth, and is nearly divided in two by deep bays running in opposite to each other from the southeastern and northwestern ends. It is 570 feet high on its northeastern side and has the appearance of two islands when seen from the northwestward. The village of Isto, at the head of the bay on the southeastern side, contains the few inhabitants of the island.

The northeastern shore is nearly straight and there is a depth of 30 fathoms at 600 yards from it; the southwestern side is bordered for a distance of $1\frac{1}{2}$ miles by islets, rocks, and shoals, with deep water between and amongst them. There is no anchorage on any part of the coast, except in the two bays, and even they are exposed.

In the channel between Isto and Skarda, which has a central depth of 40 fathoms, navigation is rendered difficult by the numerous rocks and shoals in the approach to its entrance, as well as by the rapidity of the current. In proceeding through it, the whole of the group southwestward of Isto should be left to the eastward, but the northwesternmost of the rocks and islets should be closed so as to avoid the $4\frac{1}{2}$ -fathom patch off the southern point of Skarda.

Kok Shoal.—Nearly 1 mile northeastward of the eastern coast of Skarda, and about the same distance 273° from Kok Point, Isto, is Kok Shoal, a $1\frac{1}{2}$ -fathom patch with deep water all around; it may be avoided by keeping either Skardo or Isto aboard.

Telegraph cables.—There is a telegraph cable from Nozdre Cove on the southeastern side of Selve Island to the head of Koziraca Bay on the northern side of Isto Island, thence across the narrowest part of Port Zapuntello, between Isto and Melada.

Benusic Rock Light.—A group flashing white light, is exhibited at 32 feet above high water from a red conical tower 28 feet high on Benusic Rock, which is situated about 400 yards southeastward of the southern extremity of Isto Island, and should be visible 8 miles. The light is unwatched.

Port Isto Mole Light.—A fixed green light is exhibited, at 18 feet above high water from a green lamp-post 16 feet high on Port Isto Mole, and should be visible 2 miles. The light is unwatched. (See Light List.)

Melada Island—Port Zapuntello.—Melada Island, 6 miles in length in a northwestern and southeastern direction, and about $2\frac{1}{2}$ miles in breadth, with a broken coast line, is separated from the southern end of Isto by a very narrow channel 3 fathoms deep which leads to the small port of Zapuntello at the northern end of Melada, formed by the shores of the two islands. The deepest entrance to the port is from the eastward.

When seen from a distance Melada presents an irregular outline of barren or bush-covered hills, of which the highest near the middle of the island is cone-shaped and 495 feet high; Mount Knezak, northwestward of Zapuntello Village, is 466 feet high; the southwestern point is 430 feet, and the hill at the eastern end 300 feet. The inhabitants may amount to about 300, mostly mariners and fishermen.

The northwestern part of the island is bordered westward by several islets, rocks, and shoals, being a continuation of those fronting Isto Island, of which Tramerka Islet, 164 feet high, is the largest.

About $\frac{1}{2}$ mile westward of the northern end of Melada, there is a shoal with 6 feet water, marked by an iron pole beacon surmounted by a ball 18 feet above the water.

The northeastern coast of Melada is irregular with several small islets and shoals lying off and projecting from it, the outer hidden danger being rather less than 1 mile from the shore; with the exception of Port Manzo, there is no port or harbor on this coast.

Rocks.—A rock, with $4\frac{1}{2}$ fathoms water, lies $\frac{1}{4}$ mile northward of Biljavka Point, on the east coast of Melada Island.

A shoal with 5 fathoms water lies 1,200 yards southwestward of Stopanja Point, the eastern point of Melada Island.

Vrana Point Light.—An occulting red light is exhibited, at 42 feet above high water, from a red iron tower with a gallery, 29 feet high, situated 45 yards within Verana Point, the northern extremity of the island, and should be visible 4 miles. The light is unwatched. (See Light List.)

Berguglie Bay.—This well-sheltered bay is formed by a tongue of land projecting in a south-southwesterly direction from the main portion of Melada, on its southwestern side, and enclosing a space $2\frac{1}{2}$ miles long and 1 mile wide at the entrance, gradually converging to its head.

The bay has depths of from 10 to 20 fathoms, is well sheltered from all winds, and a considerable number of vessels of any size may anchor in any part of it, though it is not much used except by small vessels. The best berth is in about 9 fathoms, northward of Brguiski Islet on the northeastern side of the bay; well protected from strong southeasters.

Brguiski Islet is connected with the shore by a flat, over which in the deepest part there is about 14 feet water.

Vrulje Cove.—The bottom in Vrulje Cove, to the northward of Brguiski Islet, is rocky, and unsuitable for anchorage.

Port Lucina—Melada village, where provisions may be obtained, is at the head of a little creek named Port Lucina, on the eastern side at the entrance of Berguglie Bay.

Bonaster Point, the termination of the tongue of land forming the southwestern side of Berguglie Bay, is 430 feet high; at 600 yards from the shore and southward of it, is a shoal with $5\frac{1}{2}$ fathoms water; and $\frac{1}{2}$ mile east-northeastward but rather nearer the shore, is the Bonaster Rock with 3 fathoms water in Settebocche Channel, the approach to Berguglie Bay from the westward.

Light.—At the inner end of Port Lucina, at 31 yards from the shore, a fixed red light is exhibited from the window of a white house, at an elevation of 29 feet above the sea, visible 8 miles. The light in sight leads clear of Bonaster Point and of the Bacili Islets but over the Bonaster Rock. (For limits of sector, see Light List.)

Port Lucina Light in sight leads over the $5\frac{1}{2}$ -fathom shoal, as well as Bonaster Rock, in Settebocche Channel.

Golac Islet.—This islet, 118 feet high, is on the southern side of the entrance to Berguglie Bay in Settebocche Channel, the passage between Melada and Grossa Islands; about $\frac{1}{4}$ mile southward of Golac Islet, lies Berstjak Islet, with a 1-fathom patch in the fairway between; Berstjak is connected with the northern end of Grossa by a ridge with 1 foot water.

Zverinac Island.—A patch, with $4\frac{1}{2}$ fathoms water, lies $\frac{1}{4}$ mile southward of Skrivada Point.

Light.—An occulting light, showing red and white sectors, is exhibited at 88 feet above high water from a white conical iron tower 23 feet high on the northwestern end of Tun Veliki Island, 40 yards inland; the red light should be visible 8 miles, and the white 12 miles. The light is unwatched.

For the sectors of the light, see Light List and chart. The white sectors indicate the passage between Bonaster Point and Golac Island, on the west, and that between Trata and Vrtlac Islands, on the east.

Directions—Settebocche Channel, the passage between Melada Island and Golac Islet, is about $\frac{1}{2}$ mile wide and is generally taken by vessels from the westward bound to Zara, the only difficulty being the rapid current. A vessel should bring Golac Islet to bear about East and steer for it. Tramerka Islet, northward of the passage, will be recognized by its double hill and bushy sides; and the position of the channel at night is indicated at a considerable distance by Bianche Light on Grossa Island, and, on a nearer approach, by the red arc of light from Port Lucina when on the right bearing (between 50° and 57°) to see it. The Bacili Islets and the $5\frac{1}{2}$ and 3 fathom shoals off Bonaster Point at the entrance to Berguglie Bay, should have a wide berth. The shoals are covered by the red light at Lucina.

To proceed through to the Zara Channel, Golac Islet should be left a short distance to the southward; then steer about 93° for the narrow passage between Tun Mali on the north, and Tun Veliki on the south, the passage is only about 400 yards wide, but the depth in it is from 15 to 17 fathoms. When past these two islets, the strength of the current requires that care should be taken to avoid Trata (eastward of Kamenjak), which two islets are connected by a ridge, and Vrtlac Islets; the northern extremities of Tun Veliki and Zverinac Islets in line, lead nearly midway between them. A shoal extends 300 yards northwestward from Vrtlac.

If bound to Berguglie Bay, after following the directions for entering Settebocche Channel, a vessel should give Bonaster Point a berth of at least 800 yards, in order to avoid the $5\frac{1}{2}$ -fathom patch and the Bonaster Rock of 3 fathoms before mentioned; or, if it is intended to pass within those shoals, round Bonaster Point at the distance of 300 yards, so as to pass midway between the rock and the point, thence to Port Lucina or to the head of Berguglie Bay.

Vrtlac Islet.—A shoal with $5\frac{1}{2}$ fathoms water lies 600 yards northwestward of this islet.

There are heavy tide rips to the southward of Vrtlac Islet during the rising tide.

Glavica Point Light.—A group flashing green light is exhibited, at 29 feet above high water, from a red post, with platform, over a red cylindrical hut, 18 feet high, on Glavica Point, the eastern entrance point of Port Manzo, and should be visible 4 miles. The light is unwatched. (See Light List.)

Port Manzo is a bay about $\frac{1}{2}$ mile deep, situated $1\frac{1}{2}$ miles northwest of Stopanja Point, the southeastern extremity of Melada; it is fronted by Asino Islet, 78 feet high, under cover of which there is anchorage in a depth of 8 or 9 fathoms, mud.

Selve Island, situated from 3 to $3\frac{1}{2}$ miles northeastward of Premuda Island, is $4\frac{1}{2}$ miles in length, nearly 2 miles in breadth at the northern part, where it is 262 feet high, while the southern part is 98 feet high, and the island being low in the middle has the appearance at a short distance seaward of two round islands sloping gradually toward the shore. It is tolerably cultivated and has a more fertile appearance than the neighboring island; it contains a population of about 1,100, whose chief occupations are fishing and rearing cattle. The coasts generally are of little height and clear of danger.

Telegraph cables.—Selve Island is connected with the southern end of Lussin by electric cable; and also with Ulbo, Puntadura, and Melada Islands by cable from Nozdre Cove, near the southeastern end of Selve. Anchorage is prohibited in the vicinity of the cables.

Selve Road is a bay on the western side of the low land, about the middle of the island; it is a good anchorage in a bora for vessels of any size. The best berth is in a depth of 11 fathoms, sand and gravel, good holding ground, about $\frac{1}{2}$ mile from the shore, with Selve Church bearing 104° . Water and provisions may be obtained at the village.

Lights.—At San Antonio Point, on the southwestern side of Selve Island, a fixed white light, elevated 28 feet above the sea, is exhibited from an iron support attached to the keeper's dwelling; it is visible 10 miles.

A fixed red light, elevated 16 feet above the sea, visible 3 miles, is shown at Port Zalie, Selve Roadstead.

A fixed red light is exhibited, at 22 feet above high water, from the top of an iron hut, 20 feet high, on the head of the mole at Selve Harbor, on the eastern coast of Selve Island, and should be visible 5 miles. The light is unwatched.

At Arat Point, southern extremity of Selve Island, a fixed red light (unwatched) is exhibited from an iron framework, at an elevation of 52 feet above the sea, visible 5 miles. Shoal water extends about 200 yards southward of the light structure.

Pettini Islets, lying nearly in mid-channel between the southeastern ends of Selve and Premuda, are three dark, barren, steep, narrow islets, from 128 to 170 feet in height, together extending over a space of $1\frac{1}{2}$ miles in a northwest and southeast direction. Detached

shoals with 1 fathom water extend $\frac{3}{4}$ mile northwestward from their northwestern extremity, and shoal water extends also a short distance from their southeastern end.

Krizice Rocks.—Midway between the South Pettini Islet and the northern end of Isto Island are the Krizice Rocks; and, southward of these rocks, $\frac{3}{4}$ mile from the northern end of Isto and the same distance from the shore of Skarda, is Kok Shoal with $1\frac{1}{2}$ fathoms water, before mentioned.

Ulbo Island, the next large island east of Selve Island, is 5 miles in length north and south, and its extreme breadth is $2\frac{1}{2}$ miles, but narrowing in the middle to $\frac{3}{4}$ mile, the coast on either side forming a bay. Its northern end is 111 feet high, the greatest height of the southern part being 236 feet, and, like Selve, it sinks in the middle to low land. A considerable portion of the island is cultivated and cattle are reared. The village is on the western side.

Shoals—Buoy.—Sib Point, the northwestern extremity of Ulbo, terminates in a long rock or islet 16 feet above water, and from it, shallow water extends about 300 yards. A mile southward of Sib Point is Kuriak Islet surrounded by reefs, which also connect it with the shore.

On the northeastern side of the island are the Fucin Rocks, reaching $\frac{1}{2}$ mile offshore, mostly sunken and steep-to.

A shoal, named Grisni Muli Shoal, extending $\frac{3}{4}$ mile from Ploc Point, the southern extremity of Ulbo, terminates in a $2\frac{1}{2}$ -fathom patch marked by a white buoy surmounted with a ball, moored in a depth of $3\frac{3}{4}$ fathoms. Elsewhere, at a prudent distance from the shore, the water is deep.

Port Ulbo, in the bay northward of Tale Point, the western extremity of Ulbo Island, is bounded northward by Kuriak Islet and the shoals before described; it is exposed to winds from the northwest, but good anchorage may be obtained abreast the village, in a depth of 7 to 10 fathoms, sand and mud, at 600 yards from the shore. Small supplies may be obtained.

Tale Point is bordered by shoal water and should not be rounded closely. With this exception, the point is separated from Selve Island by a deep channel nearly $\frac{3}{4}$ mile wide.

Light.—A fixed green light is exhibited, at 18 feet above high water, from a lamp-post, 16 feet high, on Port Ulbo Molehead, and should be visible 3 miles. The light is unwatched, is obscured over Kuriak Island, and shows white toward the shore end of the mole. (See Light List.)

Morovnik Islet and Bank.—Morovnik Islet, situated 1,600 yards 312° from Sib Point, is about 600 yards in diameter, 16 feet high and surrounded by shallow water; it should not be approached within 600 yards.

At $1\frac{1}{2}$ miles 329° from the center of the islet is the rocky bank of Morovnik, about $\frac{1}{2}$ mile in extent, with a depth of 2 to 8 fathoms. The shoalest part is in line with Morovnik and Kuriak Islets, and, from it, the northwestern extremity of Selve Island bears 222° 3.3 miles.

Ulbo Channel.—The islet and bank are on the eastern side of the Ulbo Channel, leading to Port Ulbo, and the islet is 2 miles from the shore of Selve Island, which forms the western side of the channel. The channel is often taken by small vessels from Venice bound to Zara.

Magresina (Planik) Islet, $1\frac{1}{2}$ miles eastward of Ulbo, is $1\frac{1}{2}$ miles in length, about $\frac{1}{4}$ mile wide, and 112 feet in height. A shoal extends about 600 yards from its northern end. The northeastern part of the islet is bare, the remainder is covered with bushes. The smaller islet of Magresina Picc, 20 feet high, is $\frac{1}{2}$ mile southeastward of Magresina, and the two are almost connected by shallow ridges extending from them.

Poklib Islet, 26 feet high, is nearly midway between Magresina and Maon Island, northeastward of it. Poklib is nearly 400 yards in diameter. The passage on either side is clear of danger.

Light.—A group flashing white light is exhibited, at 52 feet above high water, from a white iron conical tower 34 feet high, on the summit of Poklib Islet, and should be visible 12 miles. The light is unwatched. (See Light List.)

Pago Channel, the passage next eastward of Quarnerolo Channel, is formed by Arbe and Dolin Island on the northeast, and Laganj and Dolfin Islets, with the long narrow projection of Pago Island on the southwest. The channel is everywhere clear and deep. It leads to the Morlacca Channel and is used by vessels bound either to Arbe or to Carlopago on the Croatian Coast.

Pago Island.—This island is 32 miles in length and its extreme breadth is 5 miles, the widest part being at the southern end, but the coast line is very irregular and indented with bays and deep inlets. The northern part for upward of 10 miles is a mere tongue of land, on an average rather less than 1 mile across, and from 300 to 450 feet high. Mount St. Vito, the highest point, near the middle of the island, is 1,142 feet above the sea.

Pago is one of the four large islands of the Quarnero Group, but only a small portion, sheltered from northerly winds, is cultivated. Unlike Arbe, it is unprotected by high land northeastward, and its climate is comparatively severe in winter, when it is frequently covered with snow and northerly winds sweep over it with extreme violence. There is a population of not more than 5,000, most of whom dwell in the town of Pago.

The chief products are salt, collected from numerous salt ponds around a lake southeastward of the town of Pago, honey, oil, and wine. Sheep and goats are reared in considerable numbers. Only the northern part of the island produces wood of any kind.

Telegraph cables.—A telegraph cable connects Pago and Arbe Islands, leaving the former at Loni Point, the northern extremity of the island, and crossing to Ferkanjo Point in the latter. Another cable connects Pago at Prutna Point, the southern extremity of the island, with St. Vito on the mainland.

Eastern shore.—Opposite the mainland, the coast is rocky, steep, and barren, with deep water at a short distance from it. Strong northerly winds are frequent there, and, with the exception of Pago Bay, it affords no shelter whatever.

Pago Bay.—This so-called bay is in fact a land-locked basin more than 8 miles in length in a northwest and southeast direction, about 2 miles in breadth when within the entrance and narrowing toward both ends. The entrance is on the northeastern coast, near the middle of the island. It is open toward the southeast, and the land on the eastern side, terminating in San Cristoforo Point, overlapping by $1\frac{1}{2}$ miles that on the western side, forms a passage nearly $\frac{1}{2}$ mile wide, called the Bocca di Pago.

The basin is bordered by high land, more especially on the southwest. The shores are generally clear of danger, but in the northern part of the bay, on the southwestern side about 3 miles from the western point of entrance, the shore is foul for some distance with rocks above water nearly in mid-channel; the shore eastward of these rocks is also foul, but there is a depth of 12 fathoms between. The village of Saska is at the northwestern head of the basin and from it this part is known as Saska Bay.

Pago—Anchorage.—The town of Pago is at the southeastern head of the basin, $2\frac{1}{4}$ miles southward of the entrance. Both shores here are bordered by a narrow bank, and the anchorage is midway between and $\frac{3}{4}$ mile from the church in a depth of about 12 fathoms, mud. Vessels visiting the bay for salt anchor farther in and secure to the shore. The passage to this inner anchorage has a depth of $14\frac{1}{2}$ feet and is marked by groups of posts painted black on the port hand when entering and by groups painted red on the starboard hand. There is also anchorage in the small bay of Slana just within the entrance on the northeastern side.

Pago Bay Lights.—An occulting white light is exhibited, at 33 feet above high water, from a red iron post, 22 feet high, on San Cristoforo Point and is visible 7 miles. The light is unwatched and is obscured in Molacca Channel to the northward of the point.

An occulting red light is exhibited, at 25 feet above high water, from a red iron post, 17 feet high, on San Nicolo Point and is visible 4 miles; it is unwatched.

Range lights.—A fixed red light is exhibited, at 21 feet above high water, from an iron post, 18 feet high, on the outer end of the North Mole of Port Pago and is visible 3 miles.

A fixed red light is exhibited, at 22 feet above high water, from an iron post, 18 feet high, situated 55 yards 147° from the preceding light post and is visible 3 miles.

The lights are unwatched.

The lights in line 147° lead into the inner anchorage through the channel marked by posts. (See Light List.)

San Cristoforo Shoal.—San Cristoforo Point, on the eastern side of entrance to Pago Bay, has on it an old chapel, and at the foot of the point and close to it is a sunken rock. Nearly 700 yards from the point, 166° from the chapel, is a rocky 2-fathom shoal, steep to all around. Three small rocks, also steep to, will be seen off the inner point on the northern side in entering.

Directions.—From the northward there is no difficulty in entering Pago Bay; San Cristoforo Point should be passed at the distance of 300 or 400 yards. In coming from the southward, in order to clear the San Cristoforo Shoal of 2 fathoms, keep the western coast close aboard until San Cristoforo Chapel bears eastward 3° , then steer in mid-channel.

Pago, west coast—Shoal—Beacons.—The long narrow north-western arm of Pago terminates sharply in Loni Point, on which stands San Martin's telegraph tower. At about $\frac{1}{2}$ mile 273° from this point there is a shoal with $3\frac{1}{2}$ fathoms water; at 600 yards westward of it the depth is 7 fathoms, and at $\frac{1}{2}$ mile southward of the point lies Mata Shoal covered with 4 feet water; this shoal is marked by a pole beacon with ball painted white. From thence southward the western coast is irregular, with several coves and deep water all along as far as Gaja Point, a distance of 10 miles.

Gaja Point is foul for 600 yards off-shore, and the coast bank, with several patches of $4\frac{1}{2}$ to 10 fathoms, extends $1\frac{1}{2}$ miles from the land as far southeastward as Slatina Bay. The village and church of Novaglia stands at the head of the little bay of the same name on the southern side of Gaja Point.

Light.—A fixed red light, with a green sector, is exhibited, at 20 feet above high water, from a lamp-post, 17 feet high, on the outer end of Port Novaglia Mole; the red light is visible 3 miles and the green light 2 miles. The light is unwatched. The green sector of the light leads in $2\frac{3}{4}$ fathoms water clear of the shoals off Points Gaja and Vrtlic. (See Light List.)

Tavernelle Cove Light.—A fixed white light, with a red sector, is exhibited, at 27 feet above high water, from an iron lamp-post, 14 feet high, on the south point of Tavernelle Cove; the white light is visible 4 miles and the red light 3 miles. The light is unwatched. For the red sector, which covers Mata Shoal and the $3\frac{1}{2}$ -fathom shoal about 1,200 yards north-northwestward of it, see Light List and chart.

Port Simoni—Light.—A fixed white light is exhibited at 20 feet above high water from an iron lamp-post, 15 feet high, on the point on the southern side of the entrance to the port, and is visible 5 miles. The light is unwatched.

Slatina Bay is 4 miles southeastward of Gaja Point, and is formed by a bend in the coast and by an islet and shoal ground extending $\frac{1}{2}$ mile northward from its western point. The bay is open northwestward, and there is anchorage in depths of from 6 to 9 fathoms, mud.

Port Simoni, a small inlet 3 miles southeastward of Slatina Bay, and 2 miles northeastward of Maon Island, is protected on all sides, and has a depth of from 6 to 9 fathoms, muddy bottom; its mouth is only about 200 yards wide, the northern point of entrance is foul, and a reef with 3 feet water lies about 20 yards off the second headland.

Mandrie Cove.—Half way between Slatina Bay and Port Simoni is Mandrie Cove with stone beacons on each side of the entrance.

Skerda Island, $1\frac{1}{2}$ miles southwestward of the western point of Slatina Bay, Pago Island, is a barren, bush-covered, rocky island, $1\frac{1}{2}$ miles in length, and rising to a height of 174 feet. A shoal extends about 800 yards from its southeastern extremity.

Light.—On the northwestern point of Skerda Island stands an iron circular tower, 38 feet in height, painted white, from which, at an elevation of 49 feet above the sea, is exhibited a fixed white light, visible 8 miles. (See Light List.)

Maon Island, rather more than $\frac{1}{2}$ mile southeastward of Skerda, is partly covered with bushes, is nearly 5 miles in length, and ranges from 80 to 210 feet in height; its northern and northwestern end is bordered by a narrow bank. Vessels may take shelter from a Bora under its southwestern coast in a depth of 7 or 8 fathoms, sandy bottom. Boats resort for refuge to coves in this shore.

One mile southeastward of the southern end of Maon Island lies Brusnjak Islet, 59 feet high, and between the two is a smaller islet or rock, 23 feet high. Brusnjak is surrounded by shallow water, which extends 800 yards eastward of it, with a small rock 100 yards from the shore.

Maon Channel, bounded by Skerda and Maon on the southwestern side, and Pago Island, on the northeastern side, is 10 miles in length, with an average width of $1\frac{1}{2}$ miles; but the southeastern en-

trance is considerably contracted by the shoal extending eastward from Brusnjak Islet and by the shoals extending westward from the shore of Pago Island, the space between being little more than $\frac{3}{4}$ mile. This channel, through which a rapid current flows and which is frequently visited by violent Bora gales, is seldom used and is considered dangerous for sailing vessels, but is a good, clear channel for steamers.

Pago, West coast—Port Cossion, a bay about 2 miles south-eastward of Zaglava Point, is about 2 miles in length and 1 mile wide, with a depth of from 8 to 15 fathoms, good holding ground. The shore of the bay is fringed by a bank to the distance of about 300 yards.

It affords good shelter to the largest vessels in northerly and easterly winds, but is exposed to those from south to west-northwest. There is a mooring buoy in the northern part of the port off a small pier near the health office.

Light.—A fixed red light, with a green sector, is exhibited, at 16 feet above high water, from a lamp-post 15 feet high, 120 yards eastward of Port Cossion Mole; the red light is visible 3 miles and the green 2 miles. The light is unwatched. (For the limits of the green sector, see Light List and chart.)

New Poveljana Port is on the western side and toward the southern end of Pago Island, 2 miles southward of the bay known as Port Cossion, and at the northwestern entrance of the New Poveljana Channel; it is open to northwesterly winds but sheltered from all others. It is customary for small craft to drop an anchor seaward and to secure to the shore against the Bora. A considerable swell at times sets in. The two points forming the bay are both shoal to a short distance.

The village of New Poveljana stands on an eminence about 600 yards from the eastern shore of the port and marks its position.

Puntadura Island, separated from the southern part of Pago Island by the New Poveljana Channel, is $5\frac{1}{4}$ miles in length has an extreme breadth of 2.3 miles, and the highest part, at the northwestern end, is 404 feet above the sea; toward the southeast it is low and narrow, and the island may be recognized by two flat-topped hills. Numerous flocks of sheep find pasturage, but with the exception of a plain near the middle of the island, in which is a village containing about 600 inhabitants, it is uncultivated and overgrown with bushes. The greater part of the shore of Puntadura is bordered by a narrow bank, and is only separated from the mainland of Dalmatia by the shallow and narrow Brevilacqua Strait.

Hochgrund.—Nearly midway between Puntadura and Melada Islands, a narrow ridge of sand, weed, shells, and coral, named Hochgrund, extends about 4 miles in a northwesterly direction; the depth

is 9 fathoms at its southeastern end and 6 to 8 fathoms at its north-western part, with 30 to 37 fathoms on either side.

Telegraph cables.—Puntadura is connected with the mainland by a telegraph cable through Brevilacqua Strait; and also by cable with Nozdre Cove, Selve Island.

Light.—An occulting white light is exhibited at 65 feet above high water, from a tower 67 feet high, in the front part of a two-storied house on the west coast of Puntadura Island, about $1\frac{1}{2}$ miles from its northwestern end, and is visible 13 miles. (For the arc of visibility see Light List.)

Anchorage.—A depth of 9 or 10 fathoms, muddy bottom and good holding ground, extends along the coast for about 2 miles southward of Puntadura Point, the northwestern point of the island. This locality is well protected by high lands from the Bora. A large vessel should anchor in 9 to 14 fathoms, rather more than 400 yards from the shore, with the highest part of the island bearing about 70° .

There is excellent anchorage also sheltered from all winds in the large bay on the southern side of the island. Large vessels should anchor in the middle of the bay, $\frac{1}{2}$ mile from the shore, in a depth of from 9 to 12 fathoms, mud. Small vessels anchor eastward of Kosiak Point, off Prezida Cove.

Brevilacqua Anchorage, in the same bay, is off the entrance of Brevilacqua Strait, in 8 or 9 fathoms, mud, at a long $\frac{1}{2}$ mile from either shore.

Brevilacqua Strait is a narrow boat passage between Puntadura Island and the mainland of Dalmatia, with precipitous sides which at the eastern entrance almost joint; the depth at low water is only about 1 foot.

New Poveljana Channel, between Puntadura and the southwestern part of Pago, leads from the Quarnerolo Channel to the northwestward, to Nona Bay, old Poveljana and other bays southward of Pago, which are approached from the eastward by Ljubaz Channel, between Pago and the coast of Dalmatia. It is narrow, and near the southeastern end is still further contracted to a width of about 400 yards and a depth of 4 fathoms, by shoals bordering the islands on either side. The current always sets northwestward through this channel.

Light.—On Suca Prutina, in a depth of $1\frac{1}{2}$ fathoms, from an iron framework, painted red, on masonry base, a fixed red light (unwatched) is exhibited at an elevation of 27 feet above the sea; the light is visible 5 miles. (See Light List.)

Beacon and Buoy.—The narrowest part of the New Poveljana Channel is marked by a beacon consisting of an iron staff surmounted by two disks placed crosswise and an iron flag, the whole painted

white; the beacon stands in 9 feet water on the shoal extending from Pago Island.

On the southern edge of the same shoal, southwestward of Prutna Point, is a white buoy with staff and ball in $3\frac{1}{2}$ fathoms; from it the beacon bears 293° about 1 mile, and the nearest land just westward of Prutna Point is 600 yards distant. Both beacon and buoy may be passed close to on the port hand when coming from the north-westward.

Pago, South coast—Old Povljana Bay is a deep inlet on the southeastern coast of Pago Island, with depths of 18 to 13 and 7 fathoms. Its southeastern point is prolonged by the islets Rocco and Zikovac, having a narrow 3-fathoms channel between each other, and also between Rocco Islet and Pago. This point with the islets projects into Ljubaz Bay on the mainland, while the western part of Ljubaz Bay, with Misniak Islet at its head, projects well within the entrance of Old Povljana Bay.

Vlassic Cove and Dinjiska Bay, also in the southeastern end of Pago, are eastward of Old Povljana Bay; the latter inlet though only 1,400 yards wide at the entrance, with a depth there of 23 fathoms, recedes 4 miles in a northwesterly direction, becoming very narrow and with only from 3 fathoms to 1 fathom in its inner half. The southeastern point of this bay forms the northern side of Ljubaz Channel.

Nona Bay.—This bay in the mainland, at the northwestern extremity of Dalmatia, and at the southeastern end of the New Povljana Channel is about 2 miles in length and $1\frac{1}{2}$ miles wide; its shores are bordered all around by shallow water.

The anchorage is about 1 mile from the head of the bay and 1,200 yards from the eastern shore in about 7 fathoms water; small vessels anchor further in, about 600 yards from the shore, in about 4 fathoms water. The Bora is violent here.

The town of Nona (ancient Ænona), is in the middle of an unhealthy swamp and communicates by a causeway with the mainland. It was formerly a place of importance, though it now contains a population of about 650. Water may be obtained.

Ljubaz Bay.—This bay in the Dalmatian coast is separated from that of Nona by the Peninsula, before mentioned, which extends into the entrance of Old Povljana Bay, and has on its western side the little port of San Lorenzo. Ljubaz Bay is about $2\frac{1}{2}$ miles wide and 3 miles deep. Ljubaz Castle stands on a projecting headland, which divides the head into two bays; the village of Ljubaz is in the western bay, and there is anchorage off it in a depth of 6 to 8 fathoms.

Communication between Nona and Old Povljana or any of the other bays just described, or with the Morlacca Channel by Ljubaz Strait, is simple and only requires careful reference to the chart.

Morlacca Channel—In continuation of the description of the Morlacca Channel it may be repeated that the Croatian coast is steep and rocky, backed within 1 mile of the shore by the high mountainous range of the Velebit Gebirge, and affords but little shelter, though between Lukovo and Jablanaz, $9\frac{1}{2}$ miles farther southward, are many small coves available for boats.

Jablanaz.—The town of Jablanaz is at the head of a little bay in which small vessels may take refuge, but from the proximity of the well-sheltered anchorage in the Barbato Channel, between Dolin and Arbe Islands, it is seldom used.

The gradual approach of the southeastern end of Arbe Island toward the mainland here contracts the Morlacca Channel to less than 1 mile in width, and the Glavina Bank with a least depth of 6 feet, marked by a beacon, should be carefully avoided by vessels using this channel when steering for the anchorage in Barbato Channel.

Lights.—On the northern side of Jablanaz Bay, about 40 yards from the shore, from an iron frame attached to keeper's dwelling, is exhibited at an elevation of 150 feet above the sea a fixed white light visible 12 miles.

Also, on the northern side of entrance to the inner part of the bay, about 20 yards from the shore, is shown a fixed red light, visible 2 miles. (See Light List.)

Jablanaz—Telephone.—There is a telephone office in the town.

Prisna—Beacon.—Between Jablanaz and Carlopago, about $13\frac{1}{2}$ miles farther southeastward, there are no places of shelter for anything larger than boats; but just northward of Prisna, a little boat harbor $6\frac{1}{2}$ miles southeastward of Jablanaz, a rocky shoal extending a short distance from the shore is marked by a conical stone beacon at its edge, painted vertically in red and white stripes.

Carlopago is another small bay open to southerly winds. The anchorage is close within the south entrance point, and as the space is confined, it is customary to make fast to the shore. A sunken rock lies at the foot of the northern point. The channel between it and Pago Island is rather more than 1 mile wide, but heavy weather at times renders it impracticable for several successive days.

The town and church of Carlopago is on the northern point, which, extending in a southerly direction, forms one side of the bay; it is a small town containing a population of about 750. Cistern water may be obtained at the town.

Light.—On the mole-head at Carlopago, at an elevation of 19 feet above the sea, a fixed white light is exhibited, visible 8 miles. During a bora the light can not be shown.

Telegraph.—There is a telegraph station at Carlopago.

Aspect.—The coast southward of Carlopago, like that northward of it, is still without any shelter whatever, except a few coves and inlets fit for small coasting boats. The peaks of the Velebit Gebirge range here rise to a great height close to the coast; that of Budim, 2 miles southeastward of Carlopago and only 1 mile from the sea, being 2,503 feet high, while within 3 to 5 miles of the shore between this and the southern end of the Montagna Channel, the continuation of the Morlacca Channel, are Golc-vrch, 4,760 feet high; Velika Visocica, 5,308 feet high; Visujuna, 5,351 feet high; and Sveto-brdo, 5,774 feet high.

Montagna Channel.—Beyond the southeastern end of Pago Island, the Morlacca Channel continues southeastward as the Montagna Channel, which terminates in the Fiumera Canal about 26 miles southeastward of Carlopago. The current caused by the waters of the Zermanja River, discharged into the Mare di Novegrad, is often rapid in this part.

Lights.—On Duga Point, west side of entrance to Kruzica Cove, about $2\frac{1}{2}$ miles northward of the Razance Islets, a fixed red light is exhibited, elevated 19 feet above the sea, and visible 2 miles. (See Light List).

It is intended to establish a red harbor light at Sibuljina Point, on the coast of Croatia, about $1\frac{1}{2}$ mile southeastward of Duga Point.

Ljubaz Strait, at the southeastern extremity of Pago Island, is a narrow winding passage between it and a projection from the coast of Dalmatia, about 3 miles west-northwestward of the Razance Islets. The land on each side is high and precipitous.

The depth through the strait is from 13 to 30 fathoms; the current from the Mare di Novegrad, accelerated by the waters of the Zermanja, sets strongly southwestward through it, and the bora blows with violence at times. This strait leads to the several bays, already described, between the southern end of Pago and the Dalmatian shore, which bays are generally visited by coasting vessels only.

Light.—On the eastern shore of the southern entrance to Ljubaz Strait, a fixed white light (unwatched) is exhibited at an elevation of 27 feet above the sea from an iron column painted red, on masonry base. The light is visible 8 miles. (See Light List.)

Razance Islets.—In the middle of the Montagna Channel, and about 3 miles from Ljubaz Strait, separating the southeastern extremity of Pago Island from the mainland, are the three low islets of Razance. Shoal water extends northwestward of the eastern islets and southwestward of the western islet. Two detached patches also lie southeastward of the latter islet and southwestward of the former.

Venier Castle stands on the south shore of Montagna Channel, 6 miles southeastward of Razance Islets. A shoal situated $\frac{1}{2}$ mile

northwestward of the castle is marked by an iron-pole beacon in 8 feet water, surmounted by two triangles with the points together.

Light.—From the head of the mole at Venier Castle a fixed light with red sector is exhibited at an elevation of 18 feet above the water. The white light should be seen from a distance of 4 miles, and the red light of 3 miles. (For limits of sectors see Light List and chart.)

Kulina Castle.—Shoal water extends about 600 yards southwestward of the point on which is the ruined castle of Kulina.

Fiumera Canal.—This very narrow channel, about $1\frac{1}{2}$ miles in length, leads from Morlacca Channel to the Mare di Novegrad and carries throughout depths of from 10 to 18 fathoms to within a few yards of the shores, which are from about 50 to 100 feet high, the land on the western side, near the shore and about the middle of the channel rising to 348 feet above the sea. The canal presents a picturesque appearance.

On either side the entrance points are encumbered with shoal water, consequently it is not easy of access for large vessels. In summer the wind generally blows up the strait by day and down by night.

Mare di Novegrad is a fine basin surrounded by well-wooded hills; it is about $5\frac{1}{2}$ miles in length east and west and from 1 to $2\frac{1}{2}$ miles in width, with depths of from 8 to 15 fathoms, muddy bottom. The town of Novegrad is on the southern side of the basin and defended by a fort but is of little importance.

Telegraph.—There is a telegraph station at Novegrad.

Posedaria is at the western end of Mare di Novegrad; the channel, about 10 feet deep, leading to the wharf is marked by four groups of piles surmounted by disks, two of which mark the entrance and the other two the southern edge of the channel.

The Zermanja, one of the chief rivers of Dalmatia, rises in the mountains of Croatia, receives the waters of the Kruppa River, and flows into the Mare di Novegrad on its northeastern side.

The fairway of the river is marked by pole beacons, black on starboard side entering, white on port.

Mare di Karin is a nearly circular basin about $1\frac{1}{2}$ miles in diameter, bordered by high hills, southward of and connected with the Mare di Novegrad by a narrow passage similar to the Fiumera Canal but not so deep. It is visited by boats only.

CHAPTER VII.

COAST OF DALMATIA FROM ABREAST OF THE SOUTH-EASTERN END OF PAGO ISLAND TO PORT ROGOZNICA.

The coast of Dalmatia commences in about latitude $44^{\circ} 22' N.$, the boundary line between Croatia and Dalmatia on the seashore being marked by the church of Maddalena, which stands at the head of the cove of that name. It extends southward as far as the vicinity of Lastua castle, in latitude $42^{\circ} 12' N.$, and has numerous indentations, affording good anchorage, with many off-lying islands and rocks, and deep water near the shore; the bora often blows with great violence.

Dalmatia is a mountainous country; it is traversed by the Dinaric Alps, of which the most remarkable chain is that of Montenegro, which stretches from the Alps to the Archipelago, and consists of steep and barren heights rising about 3,000 feet above the level of the sea. The heights bordering the shore at a short distance are generally bare and precipitous, and well cultivated bases seaward. In the interior are extensive forests of oak, fit for shipbuilding; those formerly near the shore have been exhausted.

The inhabitants, about 450,000 in number, live chiefly by agriculture and seafaring pursuits, and under a settled government, are reported to have become a kindly and hospitable people. Wine, oil, corn, figs, almonds, salt, wood, salt fish, etc., are exported in small quantities. Water is generally scarce.

The Department of Zara and Sebenico includes the coast between Brevilacqua Strait and Planka Point to the southeastward, an extent of about 60 miles, together with various islands and rocks.

Grossa Island is about 25 miles in length, northwest and southeast, and its width varies from 1 to 2.3 miles, the coast line on the northeastern side being irregular, with a deep indentation in the direction of the island, both at its northwestern and southeastern ends.

Its northwestern extremity consists of low, rocky land, of whitish appearance; from thence the height increases southward in a line of ash-colored rocky elevations; the highest part, Mount Vela Straza, 1,109 feet high, is a little southeastward of the middle of the island where it is just 1 mile wide. There are about 3,160 inhabitants; the chief trade is in salt fish, firewood, and salt procured from

Lake Comna at Port Tajer. The only villages are on the north-eastern extremity of the island.

Telegraph cables.—Grossa is connected by a telegraph cable with Eso Island, and thence via Uglian Island with Zara on the mainland.

Light.—On Bianche Point, the northwestern extremity of Grossa Island, is a conspicuous white circular lighthouse, with green lantern, 133 feet in height, from which is exhibited, at an elevation of 134 feet above the sea, a fixed and flashing white light. The light is visible 17 miles.

Bacili Islets.—These two islets, previously mentioned, are perfectly flat, the outer 13 feet, the inner and larger of the two only 8 feet high; they are surrounded by shoal water, and should be given a berth of $\frac{1}{2}$ mile on their eastern side: the outer or northern islet bears 324° 1.1 miles from Bianche Point Lighthouse. The shoal water extends 800 yards eastward of the islets, and it is connected with the shoal ground round the northwestern end of Grossa Island by a ridge with $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms.

Port Lungo, eastward of Bianche Point and the Bacili Islets, affords shelter to small craft in a depth of 10 fathoms, sand, about $\frac{1}{2}$ mile from San Giacomo village, at the head of the port.

In proceeding to this anchorage, whether passing northward or southward of the Bacili Islets, a good berth should be given to the shore between the lighthouse and Oklucie Point, the western point of entrance, where it is bordered by shoal water for more than 400 yards. Having opened the village, steer for it, but avoid the western shore, where a long rocky ridge, with a narrow passage on each side of Baricev Islet at its end, separates Port Lungo from Pantera Cove; the latter appears from the plan to be a snug anchorage for small craft in a depth of 7 fathoms.

Baricev Islet (rock).—There is a depth of $3\frac{1}{4}$ fathoms in the passage southeastward of Baricev Islet.

Buoy.—On the rocky ridge extending southeastward from Oklucie Point, and distant nearly 250 yards therefrom, there is a buoy with staff, in a depth of 10 feet.

The southwestern coast of Grossa Island is rocky and inaccessible. Taler Islet, 13 feet high, $5\frac{1}{2}$ miles southeastward of Bianche Lighthouse and $\frac{1}{2}$ mile from the shore, and the Misnjak, a small, rocky, 4-fathoms bank about 1 mile southward from this islet, are the only out-lying dangers.

Anchorage.—Vessels may anchor for protection from a bora along the southwestern coast, at from $\frac{1}{2}$ mile to 3 miles from the shore, in about 36 fathoms, sand. The places ordinarily preferred are from abreast of Mount Vela Straza to within about 3 miles of

Taler Islet, and also between the latter and Bianche Point. The anchor should be weighed as soon as the gale permits. The soundings farther southward are deep close in to the island.

Port Tajer, at the southeastern end of Grossa Island, is surrounded by barren hills of moderate height, and is one of the best ports in this part of the Adriatic; but though $4\frac{1}{2}$ miles in extent from the entrance to its head, it has neither town nor village on its shores. It consists of several basins communicating with each other, and has sufficient space for a considerable number of vessels in depths varying from 7 to 27 fathoms, generally sandy or mud bottom.

Rock.—A rock, with $3\frac{1}{4}$ fathoms water, lies 650 yards north-westward of Galiola Rock.

The anchorage in the first of these basins is northward of the two small islets Galiola and Korotan, in a depth of 29 fathoms sand; or a vessel may anchor with Korotan, the outer islet, bearing 296° about $\frac{1}{2}$ mile, in 33 fathoms, mud. Small craft frequently anchor on the northwestern side of Katena Island, near which is a little islet or rock; and 251° of the latter is a shoal with 12 feet water, on which is erected a square beacon of masonry $15\frac{1}{2}$ feet high.

The passage to the second basin, named Tripuljak Bay, is along the southwestern shore, leaving Galiola and Korotan Islets and a $2\frac{1}{2}$ -fathoms shoal in line between them and Gozdenjak Islet, on the starboard hand, the channel between the latter and the southwestern shore being about 400 yards wide. The depth in the southern part of Tripuljak Bay is from 12 to 16 fathoms, but in its northwestern part is a shoal with 2 fathoms water.

The third basin is beyond and northward of the second; and has no hidden dangers; it is about 1,600 yards long by 1,000 yards wide, and vessels anchor in about 11 fathoms southeastward of Fafarikulac Islet, which will be seen entering.

The fourth and most secure of the basins is at the head of the port, and has a depth of from 7 to 8 fathoms southward of the two bare islets in its northwestern part; it is perfectly sheltered, and here vessels may safely heave down for repair. Northwestward of the two islets the depth is generally under 3 fathoms.

Neither water nor provisions are procurable at Port Tajer.

Light.—An alternating fixed and flashing light is exhibited at 156 feet above high water from an octagonal iron tower 85 feet high, painted red and white in spiral bands, situated 65 yards within the northwestern extremity of the larger Sestrice Island, and should be seen 17 miles.

Tides.—It is high water, full and change, at Sestrice Islands, at 5 h. 7 m.; springs rise 6 inches.

Directions.—Port Tajer is not difficult of access, for, although numerous islands lie in the approach, all are clear of hidden dangers.

Belvedere Point should be given a berth of about 200 yards. Four islets lie off the entrance—the Sestrice Islets southeastward, and the two Germinjak Islets northwestward. The larger of the Sestrices and the larger of the Germinjak Islets are the nearest to Belvedere Point, the northwestern point of entrance, except the Tajer Rock, 6 feet high, which is about 400 yards westward of that point and has a flat trencher-like appearance, from whence its name. The Sestrice with the Abatuta Islets should be left on the starboard hand in entering, and a course steered northward to pass between them and the land within Belvedere Point until the narrow entrance to the port is opened, after which the chart must be the guide for whichever of the four basins it may be desired to anchor in.

A 5-fathom patch lies in line between Sestrice Lighthouse and the western extremity of Abatuta, 670 yards from the light.

There is a boat channel with 6 feet water leading eastward from Port Tajer to Zut Channel, between Katena and Incoronata Islands; it is named the Great Proversa Channel; the difficulty of the channel is often increased by the current which sometimes sets strongly to the southwestward. A small stone beacon marks a 3-foot rock on the Proversa Grande Shoal in the bay formed between Katena, Buc, and Incoronata Islands, eastward of Katena.

Coast.—The northeastern coast of Grossa Island has many bays, with numerous off-lying rocks and islets; in navigating amongst them the chart is the best guide. The only anchorage suitable to vessels of moderate size is that inside Kerknata Islet, in a depth of about 10 fathoms, sand, Zlagavir Village, on an eminence opposite Kerknata, is a good mark; it is about $5\frac{1}{2}$ miles from the southeastern end of Grossa.

Sale Cove.—The village and cove of this name is about $3\frac{1}{2}$ miles from the southeastern end of Grossa, and opposite the northern end of Laudara Island; it is occasionally visited by coasters, and has a small mole.

There is a conspicuous chapel, painted light blue, in the village at Sale Cove.

Light.—A fixed green light is exhibited, at 18 feet above high water, from a lamp-post, 12 feet high, on the end of the mole at Sale Cove, and should be seen 2 miles. The light is unwatched.

Laudara Island, 288 feet in height, and about 2 miles in length, lies parallel to and at 1 mile distant from the coast of Grossa southward of Sale Cove.

A rock, with less than 6 feet water, lies between its lighthouse and Mertenjak Islet northwestward of it.

Light.—On the northern extremity of Laudara Island, abreast Sale Cove, a fixed white light is exhibited at an elevation of 17 feet above the sea, visible 4 miles.

Luski or Luka Island, 230 feet high, under Mount Vela Straza, and parallel with the shore, forms, with a projecting point to which it is nearly joined, an inlet about 1 mile deep and $\frac{1}{4}$ mile wide, with depths of from 8 to 20 fathoms. The village and church of Luka are at the head of the inlet; no supplies can be obtained. The telegraph cable crosses from Luka to Dumbarca Bay, Eso Island.

Rava Island, northward of Luka, is well cultivated, with a village and church on its central and highest part, and may be safely passed on either side. Coasters anchor southwestward of Rava, and under various other islets on the northeastern coast of Grossa.

Light.—A fixed red light is exhibited from a green lamp-post, 19 feet high, on the north shore of Zmanscica Cove, situated $\frac{3}{4}$ mile northwestward of the northern point of Kerkuata Island.

Luski or Luka Island.—There is a conspicuous wind-motor, 90 feet high, situated above Luka village.

Luka Point.—A shoal, with $3\frac{1}{2}$ fathoms water, is situated near the northeast coast of Grossa Island, 400 yards southeastward of Luka Point.

Rava Island.—A shoal, with $4\frac{1}{4}$ fathoms water, lies $\frac{1}{2}$ mile northward of the northwestern point of Rava Island, and a shoal, with $3\frac{3}{4}$ fathoms water, 1,400 yards westward of the same point.

Rasip Island.—A ridge, with from 3 to 5 fathoms water, lies between the east end of Rasip Island and the 2-foot rock.

Mana Island.—A shoal with $3\frac{1}{4}$ fathoms water lies about 200 yards and a shoal, with 3 fathoms water, about 500 yards, northwestward of the islet northward of Mana Island.

Lavsa Island.—A shoal, with 2 fathoms water, lies off the southwest coast of Lavsa Island, $\frac{1}{4}$ mile northwestward of its southern point.

Incoronata Island.—This island is more than 13 miles in length and 1.3 miles in extreme breadth, becoming very narrow to the southward, where it diminishes in one place to about 200 yards across. It may be said to form a continuation of Grossa Island, and, at a distance, appears as a range of whitish conical hillocks, resembling the points of a diadem, hence its name. The highest of these hills, mount Veli Vrch, about $\frac{1}{3}$ from the northern end of the island, is 774 feet above the sea, and mount Opat, at the southern extremity, is 328 feet.

A continuous chain of islets, rocks, and shoals, with deep water between and amongst them, borders the whole southwestern coast of Incoronata Island, the islets ranging to nearly 400 feet in height. Northward of the narrow portion of the island, there are numerous anchorages for coasting vessels, but the navigation of these localities is very difficult for strangers, especially as the current sets rapidly

through the passages. Most of the dangers here are, however, a little above water. Between the two Rasip Islets, which is one of the widest openings, there is a shoal with 2 feet water.

A short distance outside the chain of islets there is a considerable depth, and 1 mile outside them there is everywhere more than 50 fathoms.

The group of islets and rocks to the southward and abreast of the southern end of Incoronata are not safe to approach as there is no anchorage whatever near or amongst them, except in the small and unfrequented port of Zakan, about 1.3 miles 240° from the southeastern extremity of Incoronata; here there is anchorage in a depth of from 10 to 15 fathoms, sand.

Kurbavela Islet.—This narrow islet, $2\frac{1}{2}$ miles in length and 387 feet high, is the southeasternmost of the group lying off the southern end of Incoronata; its rounded hillocks are rather lower than the neighboring islet of Skulj northwestward of it.

Light—Lucietta Islet.—On the summit of Lucietta, the southwestern islet of the group westward of Zuri Island, stands a stone lighthouse 70 feet high with dwelling attached, from which at an elevation of 126 feet above the sea, is exhibited a fixed white light varied by a flash, visible a distance of 17 miles.

Directions.—The whole space between the southeastern end of Incoronata and Zuri Island, is occupied by scattered islets, rocks, and shoals, with deep water between and among them and it is impossible to give any special directions for its navigation, especially as the currents are often strong; the chart and the eye must therefore be the guide. A vessel will, however, if wishing to proceed into the Zuri Channel, avoid all risk from known dangers by bringing Lucietta Lighthouse to bear 3° , and then, steering for it, pass on either side and bring it to bear 183° and keep it on that bearing. This line leads about 1,400 yards eastward of Sedlo Islet and of the Botticella Rock, 3 feet high, nearly the same distance westward of the Nodre Rock, 26 feet high, and clear of the other islets into the Zuri Channel.

Zut Channel.—The whole northeastern coast of Incoronata consists of inaccessible cliffs; the opposite coast of Zut Island is also steep. The depth in the middle of the passage is about 38 fathoms, sand and shells, and there is scarcely anchoring ground along the shore of Zut for the smallest vessel. If a sailing vessel from the eastward should be obliged to take this channel she should at once close one of the two islands and pass either on the port or starboard hand, as the case may be, of all the islets, rocks, and shoals near the middle of the entrance.

Shoals.—A shoal, with 3 fathoms water, lies 1 mile 343° from the larger Sversata Island; and a shoal, with $3\frac{1}{2}$ fathoms water, lies

near the coast of Incoronata Island, 1,200 yards southwestward from the northwestern point of Zut Island.

Mezzo Channel, with general depths of 30 to 40 fathoms, is a continuation of the Quarnerolo Channel, with which it communicates by various narrow passages between the islands; it contains many islets, rocks, and shoals, and is little frequented, preference being given in fine weather to the passage outside the islands, and, under other circumstances, to the Zara Channel.

For vessels approaching from the westward by the Settebocche Channel, between the southwestern end of Melada Island and Golac Islet, off the northern end of Grossa Island, there are three passages to the Mezzo Channel: The first is between the northern end of Grossa and Zverinac the next island east of it; in taking this passage, Zverinac should be kept close aboard at the northern entrance to avoid the shoals extending to mid-channel off the coast of Grossa Island. The second passage is between Zverinac and Tun Veliki Island, a little over 1 mile east of it; at the southern end of this passage, a shoal with $2\frac{1}{2}$ fathoms water lies in mid-channel; either side of the passage should be kept aboard to avoid it. The third passage, which is wide and clear, is between Tun Veliki and Sestrunj, the next island east of it.

Entering the Mezzo Channel from the Quarnerolo Channel, either of the three passages just described may be used, as well as a fourth, between Sestrunj Island and Rivanj and the Tre Sorelle Islets, a short distance east of it; the bottom here is rocky and anchorage indifferent. There is also a narrow $3\frac{1}{2}$ -fathom passage between Rivanj Island and the northwestern end of Uglian, through which a strong current sets.

Sparesnjak Island.—A shoal, with $4\frac{1}{2}$ fathoms water, lies 400 yards south-southeastward of Sparesnjak Island, to which it is connected by a shallow ridge.

Rocks.—A rock with $2\frac{1}{2}$ fathoms water lies about $\frac{1}{2}$ mile west-northwestward of Dikovica Island (*lat.* $43^{\circ} 53' N.$, *long.* $15^{\circ} 21' E.$). A rock, with 3 fathoms water, lies about 650 yards 160° from Galiola Rock, which lies about a mile southeastward of Dikovica Island.

Great Scala Island—Shoal.—A shoal of small extent, with $4\frac{1}{2}$ fathoms water, lies $\frac{1}{2}$ mile eastward of the northern part of Great Scala Island (*lat.* $43^{\circ} 55' N.$, *long.* $15^{\circ} 16' E.$).

Lights.—See Tun Veliki, Eso Grande, Arta Point and Karantunic; Kosara.

The Tre Sorelle Islets, or Three Sisters, of which the northern islet is 82 feet high, extend nearly 2 miles in a northwesterly direction from Rivanj Island, and 600 yards beyond them in the same direction is a sunken rock with a depth of 2 feet, but with deep water between it and the islet and close to all around.

A **beacon**, consisting of an iron perch surmounted by two disks placed crosswise, painted white, 19 feet high, stands on the center of this rock.

At 1 mile farther northwestward, in the same line, and about 800 yards from the shore near the northern end of Sestrunj, is a shoal with $2\frac{1}{2}$ fathoms.

Between Eso and Uglian islands, the only hidden danger is a sunken rock, which is marked by a beacon, about 700 yards from the shore of Eso, and 500 yards north-northwestward of Knezak Islet. Farther southward, between Incoronata and Pasman Islands, the middle of Mezzo Channel is so filled by islands, islets, rocks, and shoals as to be impracticable except for boats, therefore in continuing southward from Eso Island, the passage through the Mezzo Channel is along the shore of Pasman Island, between it and Sit Island, and the eye and chart should be the guide.

Zut and Sit islands are the most important of the islands blocking this channel; they are of sterile aspect but afford pasturage to numerous flocks of sheep.

Light.—On the southernmost of the Tre Sorelle Islands, a fixed red light, elevated 40 feet above the sea, and visible 10 miles, is exhibited from a tower over a one-story house. The light is obscured over the Tre Sorelle Islands; also over Saida Shoal. It is reported that the light shows faintly over the above shoal at 3 miles distance.

Anchorage.—Shelter from a bora may be obtained about 300 yards southwestward from the center of either of the two northern islets of the Tre Sorelle in a depth of 9 or 10 fathoms, sand; but this anchorage is exposed to southeasterly and northwesterly winds, and the current is strongly felt. There is also anchorage between the northern end of Rivanj and the coast of Sestrunj.

Sestrunj Island, from 500 to 635 feet high, is nearly 6 miles in length with an average width of about $\frac{1}{2}$ mile. It is the highest of the islands in the neighborhood, and is covered with bushes, except in the cultivated space around the village, which is one-third from the southern end of the island; shallow water extends $\frac{1}{2}$ mile off the northwestern extremity. The island of Rivanj and the Tre Sorelle Islets and dangers just mentioned are off its northeastern side; the Paranchi, two small islets, are off its southeastern end.

Rivanj Island, between Sestrunj and the northern end of Uglian, is $2\frac{1}{2}$ miles in length and 374 feet high, with a church on its summit at the center of the island.

Light.—A flashing green light is exhibited, at 26 feet above high water, from a red post with platform, over a cylindrical hut, 18 feet high, on the east coast of Rivanj Island, about 1,400 yards from its southern end, and should be seen from a distance of 4 miles. The light, which is unwatched, is partially or wholly obscured by land,

except in the strait between Rivanj and Uglian Islands, and over the low part of Point San Pietro.

Saida Shoal.—This danger lies 28° about a mile from the northern extremity of Rivanj Island. It has $2\frac{1}{2}$ fathoms on it, deep water around, and is marked on its eastern edge by a white beacon buoy with iron cage, surmounted by a ball, with the summit of the middle islet of the Tre Sorelle bearing 250° .

Eso Island lies in the middle of the northern part of the Mezzo Channel; it is $6\frac{1}{2}$ miles in length, about a mile in breadth, and its greatest height, nearly one-third from the northern end, is 558 feet. Nearly the whole of the northeastern portion is cultivated; the opposite side is covered with bushes. There are about 350 inhabitants, who manufacture earthenware for exportation.

Its northeastern side is irregular, with several coves, in one of which is the village of Esopontale. Four islets lie eastward of Eso.

Beacon.—At about 500 yards north-northwestward of Knezak, one of these islets nearly joined to Eso, and about 700 yards from the shore is a sunken rock marked by a beacon 11 feet high, painted white.

Directions.—Vessels entering the Mezzo Channel, after passing the southern end of Sestrunj, should keep on the Uglian Island side so as to avoid the dangers off the northwestern end of Eso.

Telegraph cables.—Eso Island is connected by telegraph cable with Grossa; also with Uglian, and thence with Zara on the mainland.

Lights—Eso Grande.—On the southern shore of the entrance to Eso Grande, a fixed green light is exhibited, elevated 18 feet above the sea, and visible 2 miles.

Arta Point.—On Arta Point, at the eastern side of the southern end of Eso Island, a fixed red light, elevated 19 feet above the sea, is exhibited, visible 4 miles.

Light.—A fixed red light is exhibited, at 17 feet above high water, from a lamp-post, 16 feet high, on the molehead at Port Komasovo, on the northeastern coast of Eso Island, about $\frac{1}{2}$ mile south-eastward of Knezak Island, and should be seen 3 miles.

Belo.—This little islet, 145 feet high, lies off the northwestern end of Eso; southward of it are three smaller islets, and a sunken rock about 300 yards from the shore of Eso. About 1,100 yards 14° of Belo Islet is a shoal with 3 feet water; and, $\frac{3}{4}$ mile 318° is another with 1 fathom water.

Vessels at times take shelter between Belo and Eso in about 11 fathoms, sandy bottom; but, midway, there is a shoal with $3\frac{1}{2}$ fathoms.

Uglian Island.—The southeastern end of this island almost joins the northwestern end of Pasman Island. It is $11\frac{1}{2}$ miles in length northwest and southeast, with an extreme breadth of 2 miles. Its

hills are of moderate height, the most remarkable and highest being Mount Grande, latitude $44^{\circ} 05' N.$, longitude $15^{\circ} 09' E.$, 945 feet above the sea, in the middle of the island, and another hill 1 mile southeastward of it, on which stands, very conspicuously, the old castle of St. Michiele.

There are about 7,000 inhabitants who principally reside on the northeastern side. Wine and oil are the products, and fishing the chief occupation. Like most of the Illyrian Islands, Uglian affords but little fresh water.

The southwestern coast rises abruptly, is steep-to, covered with wood, and uninhabited. At its southern end, the coast falls back and forms two or three bays fronted by the three islets and some patches with $2\frac{1}{2}$ and $3\frac{1}{2}$ fathoms water. Lamjane, one of these bays, is resorted to by small craft. This side of the island, and that of Pasman, forms the northeastern side of the Mezzo Channel.

The northeastern coast of Uglian slopes gradually to the sea, is irregular, with several coves of bold approach, and forms the southwestern side of the Zara Channel, the distance between its nearest part and the town of Zara being about 2 miles.

Shoal.—A shoal of small extent, with $3\frac{1}{2}$ fathoms water, is situated off the western coast of Uglian Island, about $\frac{3}{4}$ mile southward of Prkljuk Cove; there is a depth of $5\frac{1}{2}$ fathoms inside the shoal.

Light.—A fixed green light is exhibited from a lamp-post, 18 feet high, on the northwestern end of the mole in Lukoran Cove, about 1 mile northwestward from Port Santa Eufemia (San Euphemia.) A fixed red light, visible 3 miles, is exhibited from a green lamp-post, 17 feet high, on the northern entrance point of Kuklica Bay, 1 mile from the southeastern point of Uglian Island.

A fixed green light is exhibited, at 17 feet above high water, from a lamp-post, 13 feet high, on the molehead at Oltre, westward of the northern end of Calogera Island, and should be seen from a distance of 2 miles.

Port Santa Eufemia (Euphemia).—On San Gregorio Point, eastern side of entrance to port Santa Eufemia, a fixed light, with red and white sectors, elevated 21 feet above high water, is exhibited, visible 3 miles.

Port Kale.—The only anchorage is Port Kale, between Calogera or Lazaretto Islet and the shore of Uglian; the islet is 295 feet high, overgrown with bushes, and on its northwestern side are a house, some mills, and a patch of cultivated ground.

The village of Kale is at the head of the bay southward of Calogera Islet.

Karantunic.—On the summit of Karantunic Rock, off the southern end of Uglian Island, and on the northern side of the western entrance to Zdrelec Strait, a fixed white light is exhibited from a

small white iron tower, at an elevation of 104 feet above the sea, visible 7 miles.

Beacon.—A square stone beacon, 6 feet high, stands in 7 feet water about 100 yards southward of San Pietro Point, on the eastern coast of Uglian Island, nearly 1 mile southeastward of San Gregorio Point, Port Santa Eufemia.

Telegraph.—There is a post and telegraph office at Ugliano (Uglian), on the eastern coast of the island, about 2.4 miles southeastward from its northwestern extremity.

Telegraph cables.—A telegraph cable connects Oltre, on the eastern coast of Uglian with Zara on the mainland abreast; cables also connect Uglian with Eso and thence to Grossa Island.

Zdrelac Strait (lat. $44^{\circ} 01' N.$, long. $15^{\circ} 15' E.$), the channel between Uglian and Pasman Islands, has a depth of $9\frac{3}{4}$ feet over a length of about 400 yards, with a breadth of 26 feet at the bottom and 39 feet at sea level.

The northern end of the channel is marked by two groups of stakes surmounted by boards painted red and white; the southern end by two iron poles fixed in the rocks carrying similar boards. On Uglian, northward of the cutting, two poles, surmounted by boards, kept in line, lead through the axis of the channel.

Port Zdrelac is a small basin at the eastern end of Zdrelac Strait, and has a depth of little more than 2 fathoms, mud; from the Zara Channel the two islands appear to be nearly united at the head of the harbor.

Pasman Island.—This island is $11\frac{1}{2}$ miles in length in a north-west and southeast direction, nearly the same as Uglian, and its breadth near the middle $2\frac{1}{2}$ miles. It reaches 900 feet in height about one-fourth its length from the northwestern end, and is rather more hilly than Uglian, of which it would be the continuation but for the break caused by Zdrelac Strait. It contains about 3,500 inhabitants, of whom the greater part reside in villages on the northeastern side; their occupations and the produce of the soil are similar to those of Uglian.

Light.—A fixed green light is exhibited from a green lamp-post, 16 feet high, on the head of the mole in San Luka Cove, which is situated on the northeastern coast of Pasman Island, about 1,600 yards from its northern point.

Telegraph.—There are telegraph stations at Pasman town, Zdrelac, and Tkon.

From Tkon a submarine cable is laid to Zara Vecchia on the mainland.

Port Krusevica and Soline Cove.—Both on the southwestern side of Pasman, the former northward of Kosara Island and 3 miles from the southeastern extremity of Pasman; the latter, 2 miles far-

ther northwestward, are frequented by small craft which make fast a line to the shore; in both, the depth is about 12 fathoms. Bora squalls are severely felt in them.

Light—Kosara.—On the western extremity of Kosara Island, lying in the Mezzo Channel off the southern end of Pasman, a fixed white light is exhibited from an iron tower, at an elevation of 39 feet above high water, and is visible 8 miles.

Soline Cove.—The bottom in the central part of Soline Cove is rocky, and only the northern and southeastern parts of the cove are suitable for anchorage.

Shoal.—From Borovnjak Point, a rocky bank with 2 fathoms water, extends $\frac{1}{2}$ mile southward.

Triluke Cove, at the southeastern extremity of Pasman, is convenient for small vessels prevented by the current or contrary winds from proceeding through Pasman Strait; it has depths of from 10 to 15 fathoms, muddy bottom, and is well protected from either the Bora or westerly winds by the land and Lisanj Island, and from southerly winds by Gangaro and the Kotola Islets. A rocky shoal with about 3 feet water lies near the eastern point of Lisanja Island; and, farther out, at nearly $\frac{1}{2}$ mile and 1,350 yards, respectively, from the southeastern side of the island, are two rocks above water, with 5 fathoms between them and the shoal.

Shoal.—A shoal with 2 fathoms water lies 200 yards 26° from the northwestern Kotola Islet, and there is apparently, by the chart, a shoal the same distance northwest of that islet. At 600 yards southward of the easternmost Kotola Islet is another rocky shoal of $4\frac{1}{2}$ fathoms. From Borovnjak Point, the southern extremity of Pasman, a rocky bank with 2 fathoms water extends 300 yards southeastward; the channel between this bank and Kamicic Island is 1,200 yards wide and that leading to the anchorage is on either side of Kamicic Islet, avoiding the shoal off Borovnjak Point, and passing northward and eastward of the Kotola and Lisanj Islets and of their out-lying shoals just described.

Zara Channel.—The depth in this channel between Uglian and Pasman Islands on the one side, and the coast of Dalmatia on the other, varies from 27 fathoms at the entrance, to 8 fathoms, mud and sand, near Pasman Strait, its continuation southward. There are no hidden dangers if we except the Saida Shoal, already described, and a 4-fathoms rocky shoal $3\frac{1}{2}$ miles northeastward of it, on the opposite side of the channel, and about 267° $2\frac{3}{4}$ miles from the village of Zaton on the mainland.

The coast of the mainland from Artic Point (lat. $44^\circ 16' N.$, long. $15^\circ 06' E.$), about a mile southwestward of Brevilacqua strait, to 4 miles southeastward of Zara, is backed by low hills and well cultivated ground; from thence southward, as far as the neighborhood of

the town of Zara Vecchia, the land is higher and of desolate aspect.

Petrcani (lat. $44^{\circ} 11' N.$, long. $15^{\circ} 09' E.$)—Halfway between Artic Point and Zara, and about one mile southeastward of Skala Point, is the village of Petrcani, at the head of Port Schiavina; there is a mooring buoy in the road.

Telephone.—There is a telephone station at Petrcani.

Light.—At Radman Point, on the southern side of Port Schiavina, a fixed light with white and red sectors is shown from an iron column at an elevation of 19 feet above the sea, visible 3 miles for the red and 4 miles for the white.

Anchorage.—Diklo Anchorage, about 8 miles from Artic Point and nearly 3 miles southeastward of Petrcani, has a depth of 10 or 11 fathoms, mud, a little southward of the town of Diklo and from 600 to 1,000 yards offshore.

Port Zara (lat. $44^{\circ} 07' N.$, long. $15^{\circ} 13' E.$) is a secure little harbor, rather more than 200 yards wide, abreast the central part of Uglian Island and 2 miles southeastward of Diklo; the harbor is inside a point which extends northwestward nearly $\frac{3}{4}$ mile parallel with the coast; on this point the town of Zara is built.

Franz Josef Mole is on the southwestern side of the peninsula on which the town stands. It is 984 yards long, with 5 feet water alongside, and a mole in the middle of it is 87 yards long, with $14\frac{1}{2}$ feet water alongside.

A mole upward of 200 yards in length projects from the eastern shore opposite the northern point of the town, which in part covers the mouth of the port and narrows the entrance to less than 100 yards. The depths are from 8 to 10 fathoms near the entrance, from whence they decrease regularly to 2 fathoms at the head of the port; the bottom on the northeastern side is rocky. Vessels in the inner part of the harbor moor with a cable to each shore.

Buoys and beacons.—On the shoal extending from Maestro Point, east side of approach, is a white stone beacon 8 feet high, erected in 6 feet water, 76 yards from the shore, and there is no passage inside it. A white mooring buoy, belonging to the Austrian Lloyd's Co., lies in 8 fathoms in the widest part of the harbor, opposite Bora Cove; small vessels of war are permitted for temporary purposes to make fast to the buoy, but if a vessel is of much length it is necessary to haul the stern in towards Cereria Point, the southern point of Bora Cove, as there is not room to swing.

There is space in the port for one or two small vessels to moor head and stern, but the above buoy is in the best berth. There is a mooring buoy, farther up the harbor. A buoy lies in 16 feet water, 80 yards westward of Cereria Point, marking the edge of the shoal water.

Harbor works are in progress on a part of the shore in Port Zara, and steamers must pass them at very slow speed.

The town of Zara (ancient Jadera) is the residence of the governor of Dalmatia and is cut off from the mainland by a fosse; it was formerly entirely surrounded by fortifications, but the walls and bastions on the sea front have been leveled, giving place to buildings, a promenade and an ordinary sea wall 3 or 4 feet above the level of high water, springs, with steps here and there for convenience in landing. It contained a population of 14,376 in 1912, who carried on considerable commerce in wine, maraschino, made from the mascara or wild cherry, oil, and grain.

An arsenal, storehouses, hospitals, barracks, the ruins of an aqueduct, an opera house, and a fine cathedral attest its former importance; the marine gate is part of an ancient funeral arch. The neighboring town of Nona has furnished it with many relics of antiquity.

Coal and supplies.—About 6,000 tons of coal are usually in stock, of which about 1,500 is for the use of the Austrian Navy. Water may be procured from a spring $\frac{1}{2}$ mile southward of the town, near an old lazaretto close to the shore; rain water only can be obtained in the town. Provisions are plentiful.

Telegraph.—There is telegraphic communication between Zara and Uglian Island, thence to Eso and Grossa, the cable leaving Zara near the hospital used for contagious diseases, and being landed near Oltre, southward of San Paolo Islet. Shore beacons mark the landing places of the cables, and also of a telephone cable across the entrance of Port Zara, from the Health Office to the end of the breakwater. Anchorage and bottom fishing is prohibited in the vicinity of these cables.

Mika Point Light.—One mile northward of the town of Zara a fixed white light is exhibited from a green iron column at an elevation of 39 feet above the sea, visible 8 miles.

Fog signal.—When the signal of a passing vessel is heard at Mika Point during a fog, a bell is sounded.

Harbor lights.—At the extremity of the mole at Zara, on the port hand in entering, and also from the corner of the city wall on the starboard hand, fixed red lights, visible 2 miles, are exhibited. Two red lights, vertical, are shown when vessels can not enter as below mentioned.

A fixed green electric light, elevated 19 feet above the sea, visible 3 miles, is exhibited from Franz Joseph Mole.

Harbor regulations.—The signals for vessels leaving the harbor are now shown from an iron post erected on the southwestern corner of the new mole. All vessels are prohibited from entering the harbor when one of the following signals are shown:

a. By day: A red cone is shown on a yard fixed to the upper part of the same post.

b. By night: A red, green, and white light placed vertically are shown from the same yard.

The above signals indicate that a vessel is leaving the harbor, and are shown until she is at least 200 yards outside the entrance.

(2) While one of the above signals is shown, vessels from seaward must wait, at least 300 yards outside the entrance, allowing a clear passage for the vessel leaving, until the signals are discontinued.

(3) When two vessels are approaching the entrance of the harbor at the same time, they must not attempt to enter together, but the one astern or to the northward is to wait until the leading vessel has passed the entrance.

(4) Vessels ready to leave should hoist, by day, Flag P of the International Code, and by night a red light above a white light. Before leaving the harbor masters of vessels must apply to the harbor pilot (quay inspector) to order the necessary signal to be shown; and the vessel must not leave the harbor until the signal is made.

(5) All sailing vessels entering or leaving the harbor are to be towed or warped out unless the wind is fair. Those entering must at once proceed to the northeastern side of the harbor, and those leaving must stand to the westward directly they are clear of the entrance.

(6) Of the above regulations only article 5 applies to barges of all descriptions and specially exempted local steamers.

(7) Steamers approaching Zara Harbor must sound their steam whistles, those from the northwestward must reduce their speed when 200 yards from the entrance; and those from the southward on rounding the western angle of the sea wall.

Steamers leaving the harbor must sound their bells.

Current.—In the Zara Channel the current sets northwest and southeast, with strong winds in those directions, and attains rates up to 3 miles an hour. The current must be guarded against when going alongside of Franz Josef Mole.

Tides.—It is high water, full and change, at Zara at 7h. 55m.; springs rise 6 inches.

Anchorage.—Vessels too large to enter the port, anchor about 670 yards westward of the town, in depths of 15 to 20 fathoms, mud, or farther out if necessary. Off the western side of the town is a mooring buoy for the Austrian Lloyd's steamers.

Prohibited anchorage.—Vessels are prohibited from anchoring in the roadstead at Port Zara, with Mika Point Lighthouse bearing between 322° and 307°.

The coast—Temporary anchorages.—There are none but in-different anchorages on the Dalmatian coast between Zara and Pasman Strait, 10 miles to the southeastward. Small vessels, however, bring up between Zara and Bibinje in a depth of 9 or 10 fathoms, muddy bottom, about 400 yards from the shore; also in $5\frac{1}{2}$ fathoms at Port San Cassano, on entering which it is necessary to drop the anchor near the middle, from whence the soundings decrease rapidly, becoming rocky near the shore. Vessels also anchor northward of Galesniak Island, at the entrance to Pasman Strait, in $5\frac{1}{2}$ fathoms, a short half mile from the shore.

Light.—A fixed red light, at an elevation of 20 feet above the sea, is exhibited at Port San Cassano from an iron frame 23 feet high, in 2 fathoms water, 150 yards off-shore near Podvara Point, visible 6 miles when bearing from 200° through south and east to 315° .

Pasman Strait (lat. $44^{\circ} 0' N.$, long. $15^{\circ} 21' E.$).—The navigation of this strait, which is a continuation of the Zara Channel, is rendered difficult by the numerous islets, rocks, shoals, and currents in the vicinity of the town of Pasman, at the narrowest part of the channel. The country on both sides of the strait is well cultivated and produces oil and muscatel wine.

Babac Island, 105 feet high, is the largest and principal islet of the group lying in the middle of the strait and dividing it into two channels.

The western passage, between Babac and the town of Pasman, is the deeper, carrying $4\frac{1}{2}$ fathoms in the best water, and through narrow, is the most frequented. A bank with $2\frac{1}{2}$ fathoms occupies the center of the channel and extends about 400 yards southward of the light on Babac. Another shoal patch of 3 fathoms lies 550 yards northward of the light. The channel lies westward of both.

Lights.—A fixed white light is exhibited, at 25 feet above water, from a stone tower on a hut, 25 feet high, on the western point of Babac Island, and should be seen 8 miles. For the arc of visibility of the light see Light List.

San Filippo e Giacomo.—A fixed red light is exhibited, at 17 feet above high water, from a green lamp-post, 16 feet high, on the head of the South Mole of San Filippo e Giacomo, and should be seen from a distance of 3 miles.

Pasman.—An occulting red light is exhibited, at 17 feet above high water, from an iron lamp-post, 17 feet high, on the head of the mole at Pasman, and should be seen 4 miles.

Cavata Islet or Rock.—About $1\frac{1}{2}$ miles southeastward of Pasman town, on the eastern side of Cavata Islet or rock, from an iron framework on masonry base, in a depth of $1\frac{1}{2}$ fathoms, a fixed green light is exhibited, elevated 28 feet above the sea, and visible 8 miles.

Cavata Islet.—The light framework is in $1\frac{1}{2}$ fathoms water, and is 32 feet high; the light should be seen from a distance of 4 miles. Babac and Cavata Lights in line, 144° , clear the shoal off Brizine Point and the 3-fathom patch northwestward of Babac, known as Gorzkowsky Bank.

Santa Caterina Islet.—On the southwestern extremity of Santa Caterina Islet, $1\frac{1}{2}$ miles southeastward of Babac Island, stands the keeper's dwelling, from which at an elevation of 38 feet above the sea, is exhibited a fixed red light, visible 8 miles when bearing from 152° . through east and north, to 308° . The latter bearing leads 200 yards westward of the Ostaria Rock which lies 2 miles southeastward of Zara Vecchia.

Tkon.—An orange-colored fixed light is exhibited, at 18 feet above high water, from a green lamp, 16 feet high, on the eastern molehead at Tkon, and should be seen 3 miles.

Zara Vecchia.—A fixed green light, with a red sector, is exhibited, at 20 feet above high water, from a lamp-post, 17 feet high, on the northwestern molehead at Zara Vecchia, and should be seen from a distance of 2 miles. The red sector covers Kocensko Shoal.

Directions.—The western channel is the deeper of the two, but the most intricate; the eastern one is easier for vessels under 18 feet draft.

Vessels from the northward in closing with Babac Island for the western channel, should keep about 400 yards from the northern part of the town of Pasman, so as to avoid the shore bank on the Pasman side. The eastern side of Cavata Islet, 39 feet high, just open of the western point of Babac Island, 142° , leads westward of the shoals northward of Babac; when the southern extremity of Komornik bears 82° , edge cautiously to the southward midway between the town and western extremity of Babac (on which is a chapel and the light establishment), with the eastern extremity of Monton Island, 154° ; pass the northern extremity of Monton at rather less than 200 yards to clear the shoal lying in mid-channel. Calogera Islet over Brizine Point astern leads southward of the mid-channel shoal. Pass northward of Cavata Islet, and southwestward of Planac and Santa Caterina Islets.

As the marks for the western passage in the narrowest part, where the course has to be altered are somewhat indistinct, and as the strength of the current may cause alteration in the shoals, great caution is required in vessels other than those of light draft.

From the northward, by the eastern passage, or that between Babac Island and the coast of Dalmatia, round the northern side of Komornik Islet at the distance of 300 yards and keep along by Babac at that distance with Prucanik Point on with the southwestern fall of Arta Island, leaving the Kocensko Shoal, marked by a white stone

beacon 13 feet high, on the port hand; pass Zara Vecchia about 300 yards off, and leave the islet westward of it on the starboard hand, and from thence into the middle of the channel.

The bottom is almost everywhere sand and shells, and the water being very clear the depth often appears less than it is. Both ebb and flood streams are very perceptible in the channel, and attains at times a rate of 2 miles an hour or more. When the current is opposed by a strong wind an increase of depth takes place, especially at its narrowest parts.

About 2 miles southeastward of Zara Vecchia and 300 yards from the shore is Ostaria Rock, before mentioned, off which is shoal water for some little distance.

When proceeding to Pasman Strait from the southward, the passage between the northwestern end of Morter Island and Great Arta on the starboard hand, and Vergada and off-lying islets and shoals on the port hand may be used. In taking this passage, the Moll Rock, 4 feet high and $\frac{1}{2}$ mile from the shore of Morter Island, as well as the smaller islets and dangers should be carefully avoided, the chart and eye being the guides. Or, the passage leaving Vergada with its off-lying islets and Kozina on the starboard hand, and Obonj and the Kotola Islets on the port hand, may be taken, passing on either side of the little islet of Kamicic.

The coast of the mainland between Zara Vecchia and Tunjara Cove should not be approached too closely; a depth of $5\frac{1}{2}$ fathoms will be found a little more than 300 yards from it and at this distance coasters may anchor if detained by weather.

Anchorage.—A mooring buoy for small steamers lies off Torette out of the fairway. Vessels anchor from 800 to 1,200 yards northwestward of Zara Vecchia in about $3\frac{1}{2}$ fathoms, and off San Filippo e Giacomo in $4\frac{1}{2}$ fathoms, or in the middle of the strait, southward of Santa Caterina Islet in about 8 fathoms. Cistern water in small quantities is obtainable at Zara Vecchia but no other supply, and although it is the chief town or village in Pasman Strait with 1,050 inhabitants, it is entirely unimportant.

Telegraph stations.—There are telegraph stations at San Filippo e Giacomo and Zara Vecchia.

A submarine cable is laid from the southern side of Zara Vecchia to the southeastern side of Tkon in Pasman Island. Anchorage and bottom fishing is prohibited in the vicinity of this cable.

Lights.—The following lights have been established between the south end of Pasman Strait and Morter Bay.

Babuljac Island.—An occulting red light is exhibited, at 28 feet above high water from a red iron framework, 25 feet high, on the southern extremity of Babuljac Island, and should be seen 4 miles.

Pukostiane (Pakostane).—A fixed green light is exhibited, at 14 feet above high water, from a lamp-post, 12 feet high, on the East Molehead of Pukostiane Harbor, and should be seen 2 miles. The light which shows white towards the pier, is unwatched and can not be lighted during southeasterly gales.

Artice Islets.—A group flashing green light is exhibited, at 24 feet above high water, from a red pillar, with a platform, over a red cylindrical hut, 24 feet high, on the western side of the western Artice Islet, and should be seen 5 miles.

Kusia Reef.—An occulting white light is exhibited, at 22 feet above high water, from a red iron frame beacon on a concrete block, in 10 feet water, on Kusia Reef, the bank connecting Great Arta Island and the mainland, 350 yards northeastward from the island, and should be seen 7 miles.

Malaluka Point.—A fixed red light is exhibited, at 25 feet above high water, from a red iron framework, 24 feet high, on Malaluka Point, the eastern point of Malaluka Cove (or the western point of Velikoluka Cove), and should be seen 3 miles.

Tegine Island.—A fixed green light is exhibited, at 22 feet above high water, from a red iron framework, 22 feet high, on the bank close eastward of Tegine Island, and should be seen 3 miles.

Rat Point.—A fixed white light is exhibited, at 22 feet above high water, from a red iron framework, 22 feet high, on Rat Point, the eastern point of the northern entrance to Morter Channel, and should be seen 5 miles.

Vergada Island, situated $2\frac{1}{2}$ miles southeastward of Pasman Island, is $1\frac{1}{2}$ miles in length, and consists of arid hillocks of nearly equal height; its highest part is 377 feet above the sea and there is a village on its northeastern side. There is no good anchorage, and several islets and shoal patches lie around it.

Coast.—**Tunjara Cove** (lat. $43^{\circ} 53' N.$, long. $15^{\circ} 31' E.$), in the mainland on the northern side of the point of this name, is open to the westward but is partially sheltered by the off-lying islets; the depth in the middle is $5\frac{1}{2}$ fathoms, sand. A hill overlooks and marks this anchorage; a vessel in proceeding to it should pass between Zavinae Islets and the southern point of the bay; the passage eastward of the islets is not so good.

Lake Vrana lies at the back of this part of the coast and parallel with it for a distance of $7\frac{1}{2}$ miles; the exhalations from it cause this vicinity to be unhealthful.

Zlosela Bay is a deep inlet in the main coast extending about 5 miles southeastward from abreast of the northwestern end of Morter Island and is fronted by the northern part of that island, which, with several smaller islands, islets, and shallow water, forms a complete

and unbroken chain of shoals entirely blocking the approach to the bay to all but very small vessels with local knowledge.

Water and provisions may be procured at the town of Zlosela; fish are plentiful in the bay.

Light.—A fixed red lantern light, elevated 15 feet above the sea and visible 4 miles, is exhibited at the south end of the quay at Port Zlosela.

Telegraph.—Zlosela is connected with the telegraphic system of the country.

Moll Island, Kamicac Rock—Light.—A flashing green light is exhibited from a lighthouse on Moll Island, off the northwest coast of Morter Island.

Morter Island, situated with its northwestern end about $2\frac{1}{4}$ miles southeastward of Vergada Island, is 6 miles in length with an irregular coast line, its greatest breadth not exceeding $1\frac{1}{2}$ miles; the land rises near the center to 408 feet, and is connected with the mainland by a swing bridge. It is exceedingly well cultivated and has 2,500 inhabitants, who reside on the northern and eastern sides and whose chief occupation is the culture of the vine, fig, and olive. It appears to have been an ancient cemetery. The view from the island is very beautiful.

The southwestern coast is uninhabited and has deep water close to it, affording no places of shelter even for the smallest vessels, except Kosirina Cove and the little inlet of San Nicolo—in this latter, vessels bring up when not intending to enter the channel at night. The high point at the left of the entrance is sugar-loaf shaped and marks this anchorage.

Lights.—Near the western extremity of Prisnjak Islet, the northwestern end of Morter Island, stands the keeper's dwelling, from which at an elevation of 32 feet above the sea a fixed white light is exhibited, visible 9 miles. For sector, see Light List.

Betina.—A fixed red light, at an elevation of 19 feet above the sea, is exhibited from the landing place of Betina, near the northeastern end of Morter Island, visible in clear weather from a distance of 2 miles.

Hramina.—At Hramina, on the northern coast of Morter Island, about $\frac{1}{2}$ mile westward of Betina, a fixed light, elevated 19 feet above the sea, is exhibited, showing green seaward, white toward the land, visible 2 miles.

Morter Bay lies between the southern end of Morter Island and the mainland; it is about 3 miles in length by 1 mile in breadth. It is fully sheltered from all but southeast winds and the several islands in it partly protect it from that direction.

The Kuljar (Kukuljar) Islets are four small islets, of which the largest, 55 feet high, bears 206° about 1,400 yards from the en-

trance to San Nicolo Inlet, and they lie on the northern side of approach to Morter Bay from the westward. They are steep except on the western side of the largest islet, off which is a rocky shoal; the westernmost island is just outside the largest islet and is itself scarcely more than a reef, of which the highest rock is only about 2 feet above the sea.

Light.—An occulting red light is exhibited at 42 feet above high water from a platform and cage over a gasometer 40 feet high on the eastern Kukuljar Islet. Visible 10 miles.

Maslinak Island—Light.—A group flashing green light is exhibited from a red conical iron tower, 24 feet high, on the west point of Maslinak Island, at the entrance to Morter Bay; visible 5 miles.

Shoal.—A depth of 7 fathoms lies about 400 yards westward of the northern (85 feet) Drazomaski Island.

Berghofer Shoal, with $2\frac{1}{2}$ fathoms water, lies $1\frac{1}{2}$ miles 105° from the largest of the Kuljar Islets, $\frac{1}{2}$ mile from the shore of Morter Island, with the southern end of Drazamaski Islet on with Trebocconi Church bearing about 90° .

Botticella Rock (lat. $43^\circ 45' N.$, long. $15^\circ 42' E.$), a small half-tide rock shaped like a boat and marked by a stone beacon, lies 161° about 1 mile from Obinus Point on the main coast, on the eastern side of Morter Bay. The vicinity of this and the last-mentioned danger should be avoided, especially at night.

Anchorage.—Vessels anchor in Morter Bay between Morter Island and the mainland in a depth of $11\frac{1}{2}$ fathoms, near Stretto town; and also in the small bay abreast of the town. The channel northwestward of the bridge is used by vessels of very light draft.

Lights.—Two small fixed lights are exhibited from lamp-posts on the buttresses of the swing bridge. The northern light is red; the southern light is red when the bridge is closed and green when it is open.

The fixed red light shown from Stretto Molehead is unwatched.

Directions.—In approaching Morter Bay, where there are several islets, the clock tower of Jezera is visible at a considerable distance. Nearly equidistant between the three islets at the head of the bay is a shoal with 3 fathoms water; a shoal of $4\frac{1}{2}$ fathoms lies 300 yards southeastward of the southern point of Bisaza Island, and depths of $3\frac{1}{2}$ fathoms to the eastward of Mimonjak Island. Elsewhere the shores of the bay and islets are clean and free from dangers. Berghofer Shoal in the approach should be given a berth by passing around Rat Point if from the westward, or approaching with Drazamaski Islands on about a north-northwest bearing if from the southward, and passing fairly close to them.

Zuri Island is the westernmost of the group of large islands southward of Morter Island; it is $6\frac{1}{2}$ miles in length in a northwest

and southeast direction, and its extreme breadth is $1\frac{1}{4}$ miles, tapering at either end, with irregular indented shores; the island consists of two parallel lines of hills united by a plain; the highest part is 430 feet above the sea. (Lat. $43^{\circ} 39' N.$, long. $15^{\circ} 40' E.$) At a distance, the plain not being visible, the island appears as two; the plain is well cultivated and the island is well known for its numerous Roman ruins; an extensive coral fishery was formerly carried on in its neighborhood by Neapolitan fishermen. Several islands between it and the mainland have marble quarries.

On approaching from the southward, the coast southeastward appears covered with trees and bushes; northwestward it is generally rocky and of whitish aspect. A conspicuous white monument near the northwestern extremity of Zuri forms a good landmark.

This island, with Zlarin and Provicio, presently described, are the most populous and important islands in the Sebenico district; good wine is produced and sardines and other fish are caught in great abundance.

Zuri village is on the central plain between the hills about one-third from the northwestern end of the island.

Balkun, Kosmerka, and Ravna Islets, situated about 2 miles westward of Zuri Island, form a group of five small islets, extending $1\frac{1}{4}$ miles in a northwest and southeast direction.

A sunken rock lies 105° about $\frac{1}{2}$ mile from Ravna, the southernmost islet; a sunken rock lies southwestward of Ravna.

At $1\frac{1}{4}$ miles southeastward of Ravna Islet is a rocky bank with $6\frac{1}{2}$ fathoms water, and with depths of 10 fathoms around. These islets and dangers are steep-to; Lucietta Light, to the westward, is a good guide for clearing them.

The Nodre Rock, 26 feet high, and Rapanjasnjak Islet, 36 feet in height, lie off the northwestern end of Zuri, the former $\frac{1}{2}$ mile, the latter about 1,350 yards from the island. Sedlo Islet, 49 feet high, lies $1\frac{1}{2}$ miles 248° from Nodre Rock, and Samograd Islet, 118 feet in height, lies nearly $1\frac{1}{4}$ miles 273° from Rapanjasnjak; about midway between Sedlo and Samograd Islets are the Botticella Rocks, 3 feet high.

Lucietta Lighthouse on a 180° bearing leads westward of both Nodre Rock and Rapanjasnjak Islet, and eastward of the other islets mentioned and of a small 5-fathom patch 670 yards southeast of Sedlo Islet.

Saracino Cove, on the western side of Zuri, is about $1\frac{3}{4}$ miles from the northwestern extremity of the island and, though small, is well sheltered from all but southerly winds; the anchorage is in 12 fathoms in the middle of the cove.

Stupica Bay (lat. $43^{\circ} 38' N.$, long. $15^{\circ} 41' E.$), $1\frac{1}{2}$ miles westward of the southeastern extremity of Zuri, is well protected from

northerly and westerly, but exposed to southeasterly winds. The anchorage is at the entrance in 9 to 11 fathoms; farther in, the depth is 7 fathoms and the bottom rocky. The widest channel to Stupica Bay is between Skervada and Bavkul Islets; the former is connected with the shore by shallow water. A shoal lies more than 300 yards off the eastern side of entrance.

Masirina Islet, close to the southeastern end of Zuri, is 188 feet high and clear of danger, but a rock above water lies off the southern extremity of Zuri.

Port Zuri (lat 43° 40' N., long. 15° 39' E.).—The northeastern coast, southeastward of Port Zuri, is quite exposed to the Bora, from which it affords no shelter. Small vessels anchor off the village of Zuri in from 14 to 17 fathoms, sand and weed, and secure to the shore; the port is open to the northwestward, but there is a mole, inside of which boats take refuge. The port may be recognized by some large storehouses on the seaside.

Telegraph.—There is a post and telegraph office at Port Zuri.

Zuri Channel lies between Zuri and the islands eastward of it, see the following islets and dangers; for its navigation the chart is the best guide.

Prastici Rock, on which is a depth of 9 feet, is marked by a white beacon surmounted by a ball and lies nearly a mile northwestward from the entrance of Port Zuri. A rocky shoal with 3½ fathoms, lies about 670 yards northward of the northwestern extremity of Zuri Island; another shoal, with Mikavica Rock on it, 13 feet high, and farther southeastward, lies 1½ miles 284° from the Prastici Rock.

Light.—On Hrbosnjak Islet, situated in the southeastern entrance to Zuri Channel, a fixed white light (unwatched) is exhibited from a small iron tower, painted white, at an elevation of 81 feet above the sea, visible 4 miles.

Kakan Island, on the eastern side of Zuri Channel, consists of barren hillocks with intervals covered with bushes, and is 367 feet high at its southeastern end. Kakan Rock, 6 feet high, is 650 yards from the northwestern point of the island, and there is a depth of about 10 fathoms between it and the shore.

The southwestern coast affords no shelter whatever; a shoal with 2½ fathoms lies near its southwestern end and another shoal with two islets off its southeastern extremity.

In a small bay in the middle of the northeastern coast of Kakan Island is an anchorage for small vessels in a depth of about 9 fathoms, well protected by islets on the north and by Kapri Island from easterly or southerly winds.

Tatevisnjak and Cavlin Islets.—These are the principal islets of a group of islets, shoals, and banks, extending 3 miles in a north-westerly direction from Kakan Island. Tatevisnjak (lat. 43° 43'

N., long. $15^{\circ} 35'$ E.), the largest of the group, is circular, 670 yards in diameter, and 243 feet high; Cavlin, the next in size and the northwestern islet, is 118 feet high. The smaller islets, rocks, and shallows are scattered between them and Kakan, as well as both northward and westward of Cavlin, with deep water between and amongst them; one dangerous spot covered with 6 feet water lies $289^{\circ} 1$ mile from Cavlin Islet.

The summit of Tatevisnjak, bearing eastward of 110° , leads southward of these dangers; and Mertovnjak Islet bearing southward of 183° leads westward of them.

Kapri Island, like Kakan, consists of barren hills, of which the highest is 433 feet above the sea and is near the southern end of the island, which is about $3\frac{1}{4}$ miles in length with an irregular coast line and nearly united to Kakan. The narrow channel between them is from 7 to 11 fathoms deep, but is seldom used even by the native coasters, as the current through it is rapid.

Port Kapri (lat. $43^{\circ} 41'$ N., long. $15^{\circ} 42'$ E.), an inlet on the southwestern side, is the only anchorage; the depth is about 8 fathoms at the entrance, from whence to the head the decrease is gradual. It is well sheltered, being open only to the northwestward, and affords refuge to small vessels; near it is a small village.

Sebenico approaches—Zmajan Island, the next large island eastward of Kapri, and in the western approach to Sebenico, when seen from the southward, has the appearance of a long hill, of which the highest part is 466 feet in height, and is toward the northwestward. It is rather more than 2 miles in length, and its sides, which are steep-to, afford no shelter, except in Smetna Bay, a small inlet near the southern end. Between it and Kapri is a narrow channel rendered intricate by islets and shoals, among which the current sets with considerable velocity.

Six islets form a continuous chain for about $3\frac{1}{4}$ miles southeastward of Zmajan; parallel with Zlarin Island, with which they form the channel of that name. All these islets are of safe approach except Komorica, the most southeastern, 75 feet high, close to the southern end of which is a rock awash.

Between Komorica and Duga Islet, nearly a mile westward of it, is a shoal with $3\frac{1}{2}$ fathoms water.

Bice (Tiat) Island, nearly a mile northeastward of Zmajan, consists of several conical hills covered with wood, the highest, 390 feet above the sea, being toward the northern end. It is $1\frac{1}{4}$ miles in length, and the shores are of bold approach; Port Tiascica is a deep inlet in its southern end. The channel between Bice and Zmajan Islands is deep and clear.

Lights.—A group flashing white light, showing a group of two flashes every six seconds, is exhibited, at 39 feet above high water,

from an iron post with a gallery over a gasometer, 26 feet high, about 200 yards northwestward of Tiascica Point, and should be seen from a distance of 9 miles.

Zlarin Island.—This island is $3\frac{1}{2}$ miles in length, its northern part more than 1 mile in breadth, and in the middle of the southwestern side, it rises to a height of 558 feet; when seen from the northeastward it appears to be covered with vines and olive trees; when seen from the opposite quarter it presents a very barren aspect. Between this island and the islets extending southeastward of Zmajan is the Zlarin Channel.

Port Zlarin.—At the northwestern end of the island is a triangular bay, named Port Zlarin, which has a depth of from 7 to 10 fathoms, mud, sand, and gravel. Boats find shelter in a cove near the village of Zlarin at the head of the bay. The village church is visible some distance seaward.

Light.—A fixed green light is exhibited, at 21 feet above high water, from an iron lamp-post, 18 feet high, on the head of the mole in Port Zlarin, and should be seen 2 miles.

Rozenik Rock.—About 1,600 yards northward of the entrance to Port Zlarin is Lupac Island, 206 feet high; and, from the northern part of Zlarin, rocky patches of from 3 to 9 feet water extend half way across to that island; the shoalest patch and the farthest from the shore is the Rozenik Rock. The middle passage to Port Sebenico, presently described, lies between this rock and Lupac Island.

Light.—On Rozenik (Rosenjik) Rock, from an iron framework structure on masonry base at the western end of a small mole, a fixed white light is exhibited at an elevation of 25 feet above the sea, visible 8 miles.

Telegraph cable.—Zlarin Island is in telegraphic communication with Sebenico; the cable is laid between Veles Cove, Zlarin Island, and a point 800 yards northwestward of Garmina Point; it is laid with a curve to the southeastward, the points at which the shore ends are landed being marked by stone cairns.

Zlarin Channel, $1\frac{1}{2}$ miles wide, with depths of from 30 to 35 fathoms, is formed by Bice and Zlarin Islands on the northeastern side, and by Zmajan Island and islets southeastward of it on the southwestern side; it is the best channel and that most frequented by vessels bound to Zara, or to ports to the northward, from the neighborhood of Planka Point.

Sestre Bank, with 2 fathoms water, lies in the fairway of Zlarin Channel 1.1 miles 200° from Maria Point, northwestern extremity of Zlarin Island.

Buoy.—A white conical buoy, with ball, marks its northeastern side.

Directions.—Approaching Zlarin Channel from the southward and eastward, Komorica, the southeastern islet, will be recognized, and the vessel should be steered mid-channel between it and Zlarin, and then between the buoy marking Sestre Bank and the Zlarin shore. Should the buoy not be in position, before the southern end of Sorella Islet bears 254° , and is on with the southern extremities of Ravna and Misiak Islets, close the shore of Zlarin to 600 yards, and preserve that distance from it until Rozenik light structure is well open of Zlarin bearing 31° , then haul to the westward for the passage between Zmajan and Bice Islands.

Provicio Island (lat. $43^{\circ} 43' N.$, long. $15^{\circ} 48' E.$) lies eastward of Bice (Tiat) and is 1.7 miles in length; it is generally lower than those in its vicinity and is of more agreeable aspect, being fertile, highly cultivated, and covered with vines and fruit trees. Provicio village is at the southeastern end, at the head of Port Bodok, which affords shelter to small craft only. There are many country houses here belonging to the inhabitants of Sebenico.

The population is about 1,600, many of whom are fishermen, and great quantities of salt fish are exported.

The shores are bordered by a narrow bank, except at the southwestern part which is steep-to, but southward of Sepurine village on the western side of the island, is a rocky $3\frac{1}{4}$ -fathom shoal 400 yards off-shore. In taking the channel between this island and the mainland, a mid-channel course should be preserved, as the shore on either side is bordered by shallow water.

The channel between this island and Bice is a safe passage to Vodice Road.

There is a post and telegraph office at Luka, situated at the head of Luka Harbor, on the southeastern coast of Provicio Island.

Light.—At Sepurine village, on the western side of Provicio Island, two fixed red lights, vertical, elevated respectively 24 and 19 feet above the sea, are exhibited from a red iron standard, and are visible 3 miles, between the bearing 129° , through east, to 337° . May not be lighted in bad weather.

Anchorage.—Vessels anchor off Sepurine in a depth of about 12 fathoms, sand; there is a fishing-boat cove close to the village.

Telegraph cable.—Provicio Island is in telegraphic communication with the mainland; the points where the shore ends of the cable are laid are marked by white cairns; vessels anchoring in this vicinity (north end of the island) should be careful to avoid the line of the cable.

Vodice Road (lat. $43^{\circ} 45' N.$, long. $15^{\circ} 47' E.$).—This anchorage off the mainland, northward of Provicio Island, is one of the best on the Dalmatian coast and is much frequented, especially by vessels

awaiting favorable weather to proceed through the narrow channel to Port Sebenico.

The anchorage is in a depth of 8 or 9 fathoms, sand, about midway between the village of Vodice and the northwestern point of Provicio. Vessels of light draft anchor near the village, eastward of the projecting point westward of it, preserving a distance of at least 400 yards from the shore, near which the bottom is rocky.

There is also anchorage farther westward in 7 fathoms, about 600 yards from the shore of Logorun Island; but, between the two anchorages is a rocky $4\frac{1}{2}$ -fathom shoal about 670 yards from the point southward of San Croce Church.

The passage to Vodice Road, when approaching from the southward, is between Bice (Tiat) and Provicio Islands, and when from the westward, between Bice and Logorun Islands, avoiding the extremities of both islands; or, by the channel between Provicio and the mainland.

Vodice village is of considerable size and well built. About a mile from it is the small town of Trebocconi, the birthplace of the celebrated extempore lyric poet Papizza, and where, as at Vodice, grows the cherry which produces the maraschino of Zara and Sebenico.

The shore between Vodice and Trebocconi town, to about $1\frac{1}{2}$ miles westward, is bordered by a bank with 3 fathoms water at the distance of 300 yards from the shore. Trebocconi stands on a rocky projection and is connected by a swing bridge with a point of the mainland 165 feet high; on the latter is the church of San Nicolo, a good mark for this part of the coast.

Telegraph.—There is a telegraph station at Vodice.

Lights.—From an iron post on the South Mole head of Vodice, at an elevation of 20 feet above the sea, is exhibited a fixed red light visible 3 miles. Obscured over Vodice shoal and Srma Bank. During strong southeasterly gales this light can not be exhibited.

Trebocconi—Light.—A fixed green light is exhibited, at 19 feet above high water, from an iron lamp-post, 18 feet high, on Trebocconi Quay, in the northwestern part of Vodice Road, and is visible 3 miles.

An iron beacon, surmounted with a ball, painted white, marks the southwestern side of a rock, with 3 feet, which lies about 250 yards eastward of the South Molehead, at Vodice, the 3-fathom line extends for 300 yards south-southeastward of the beacon.

Supplies.—Here is a spring, and from the abundance of its waters Vodice derives its name. Provisions are also procurable, and vessels frequently arrive from Sebenico for supplies of both.

Sebenico Channel, with general depths of 8 to 12 fathoms, is the passage formed by Provicio and Zlarin Islands on the one side and

by the mainland on the other. The southern entrance, between the southeastern extremity of Zlarin and the coast, is obstructed by several islets, between which are narrow passages. Of these islets, Duinka is the outermost and is about $\frac{1}{2}$ mile southeastward of the southern point of Zlarin.

Srima Bank—Beacon.—On the northeastern side of Sebenico Channel, about $2\frac{1}{2}$ miles from Vodice, is Srima Bank extending $2\frac{1}{2}$ cables from the shore about 150 yards from the outer edge of which, in 3 feet water, is situated an iron beacon 24 feet high, surmounted by two disks at right angles to each other.

Light—Duinka.—In the southern approach to Sebenico, on the northwest point of Duinka Islet, stands a lighthouse 27 feet high, from which, at an elevation of 26 feet above the sea, is exhibited a fixed red light visible 8 miles; when bearing from 172° through east to 326° .

Krapano (lat. $43^{\circ} 40' N.$, long. $15^{\circ} 55' E.$), an island bordering the Dalmatian shore within the southern entrance to the Sebenico Channel, is the most remarkable of the islets in this neighborhood; it is well cultivated and inhabited by about 1,100 persons whose chief occupation is the tunny fishery. Eastward of it is a narrow, tortuous, and shallow passage, with cliffy sides, leading to Andreis town and castle and to the Morinje Lake.

Vessels may anchor anywhere in the middle of the channel, in convenient depths and good holding ground, carefully avoiding the vicinity of the telegraph cable which leaves the shore about 800 yards northwestward of Garmina Point; or, if apprehensive of a Bora, close under the mainland.

Shoal water extends nearly $\frac{1}{2}$ mile southwestward of Krapano Island.

Telegraph.—There is a telegraph office in Krapano Harbor connected to the mainland by cable.

Beacons.—There are two stone beacons on the bank extending northwestward from Krapano Island; the eastern beacon is situated 1,400 yards northwestward of the northern extremity of the island, and the western beacon 120 yards 247° from the eastern beacon.

Light.—A fixed green light, elevated 18 feet above the sea, is exhibited from an iron post on the mole end at Krapano; visible from a distance of 2 miles, from the bearing of 356° through west to 130° .

Port Sebenico (lat. $43^{\circ} 44' N.$, long. $15^{\circ} 53' E.$) is a narrow basin $5\frac{1}{2}$ miles in length and 400 to 1,000 yards in width, surrounded by high land and bordered by a rocky shore; the town stands on the eastern shore facing the entrance $1\frac{1}{2}$ miles from the southwestern end of the basin, which terminates in San Pietro Bay; the northwestern arm, as it narrows 1 mile beyond the town in the opposite direction,

is named Kerka Inlet, and is crossed by a telegraph cable at that distance from the town, the shore ends of the cable on each side of the inlet being marked by small towers. The depth of the basin varies from 12 to 20 fathoms, soft mud. The port is entered by San Antonio Channel.

San Antonio Channel, about $1\frac{1}{2}$ miles in length, is the approach to Port Sebenico and lies between rocky cliffs; it is tortuous, varying in depth from 10 to 24 fathoms and in width from 200 to 400 yards, the narrowest part being at the inner end. This entrance is defended by San Nicolo, a fort built on a rock on the southern side of the channel, with a line of embrasures at the edge of the water; the passage is between the Kobila Rocks (marked by a light beacon) and the fort on the south side and the lighthouse on Jadria Point on the northern side. Paklena Bank extends about 250 yards north-eastward within the southern inner entrance points of the channel.

Lights—Jadria Point.—A fixed red light is exhibited, at 25 feet above high water, from an octagonal stone tower on a house, 27 feet high, on Jadria Point, the southern end of the islet on the northern side of the entrance of San Antonio Channel, and should be seen 5 miles. For the arc of visibility see Light List and chart.

Rocni Rock.—A group flashing green light is exhibited, at 21 feet above high water, from a red post with platform on a cylindrical beacon, 23 feet high, on Rocni Rock, the northwestern Kobila Rock, and should be seen 4 miles.

Fort San Nicolo.—A fixed green light is exhibited, at 43 feet above high water, from the northwestern side of Fort San Nicolo wall, and should be seen 4 miles. For the arc of visibility see Light List and plan.

Fog signal.—A hand fog horn is sounded.

Debela Point.—A flashing red light is exhibited, at 21 feet above high water, from a red pillar with a platform on a cylindrical hut, 22 feet high, on Debela Point, and should be seen 5 miles.

Senisna Point.—An occulting green light is exhibited, at 15 feet above high water, from a red iron post on a beacon, 15 feet high, in 16 feet water off Senisna Point, and should be seen 3 miles. The light is visible from 53° to 259° .

San Antonio Point.—A fixed green light is exhibited, at 17 feet above high water, from a red iron post, 14 feet high, on San Antonio Point, and should be seen 2 miles.

Santa Croce Point.—An occulting red light is exhibited, at 19 feet above high water, from a red iron post, 18 feet high, near the chapel on Santa Croce (Kriz) Point, and should be seen 3 miles.

Paklena Bank.—A group flashing green light is exhibited, at 19 feet above high water, from a red post with platform over a cylindri-

cal hut, 22 feet high, situated in 3 feet water on the northeastern part of Paklena Bank, and should be seen 4 miles.

Port Sebenico.—A fixed red electric light is exhibited, at 17 feet above high water, from a lamp-post, 16 feet high, on the head of Port Sebenico Mole, and should be seen 2 miles.

Beacon.—A beacon has been erected on the outer edge of the shoal extending from the coaling wharf at Port Sebenico, southwestward of the railroad station.

Rock.—A rock with $3\frac{1}{2}$ fathoms lies about 400 yards northwestward of Klobusac Point, on the eastern side of the entrance to Madalena Bay.

Mooring buoys.—There are several mooring buoys in the port.

Traffic regulation.—The limits of San Antonio Channel are defined by lines between Jadria Point and Rocni Rock Light-beacon, on the west, and between Turan Point and Paklena Light-beacon, on the east.

Traffic through the channel is regulated by signals shown from Fort Santa Anna and Fort San Nicolo, those from the former station relating to outgoing vessels, and those from the latter to incoming.

Signals.—Two black balls, placed vertically, by day, or two green lights, placed vertically, at night, indicate that the channel is clear.

A red cone, by day, or two red lights, placed vertically, at night, indicate that the channel is closed.

Steamers of 200 tons gross tonnage and upward, and sailing vessels of 100 tons and upward, together with vessels in tow, when the length from the bow of the tug to the stern of the vessel towed exceeds 330 feet, if desirous of passing through the channel, must hoist by day the International Code signal flag H, or at night exhibit two lights, placed vertically, the upper red and the lower white, such signals to be made by outgoing vessels immediately before getting under way, and by incoming vessels before arriving at the entrance to the channel.

Should a vessel disregard the above signals, the international code signal "M. N." will be hoisted, and a gun fired.

Vessels, other than those above referred to, can proceed through the channel, without regard to the signals, but must make way for those regulated by them.

Directions—Port Sebenico.—There are three passages to San Antonio Channel, the Northern, Middle, and Southern:

The Northern Passage, between the mainland and Provicio Island, has been already mentioned. In proceeding either by this or by the Middle Passage to Sebenico, between Provicio and Zlarin, care must be taken not to stand in for the entrance of San Antonio Channel until San Nicolo Fort bears northward of 60° , in order to avoid the

shoal extending southwestward from Jadria Point. In a vessel of deep draft, in order to avoid the tail of the shoal, it is necessary to steer southeastward until abreast of the second hill (223 feet high) of Zlarin Island, to bring the northern extremity of Fort San Nicolo well open southward of the beacon on the Kobila Rocks, before bearing up for the entrance.

The Middle Passage, between Provicio and Zlarin Islands, is less than 800 yards wide, with a least depth of 10 fathoms in mid-channel between Lupac Islet on the north, and the Rozenik Rock, on which there is a lighthouse, on the south.

Between the light structure and the northern extremity of Zlarin is a shoal covered with but 9 feet water.

The Southern Passage, between Zlarin on the west and Duinka and Dervenik on the east, is the best and the most frequented; it is very narrow, but opens out after passing Dervenik, and may be taken in a strong southwesterly wind, which is also a fair wind for running through San Antonio Channel; and, in bad weather from this quarter, which is here so common, a vessel may anchor in a depth of 10 or 12 fathoms between Zlarin and the mainland, or bear up for the anchorage at Vodice.

The position of Sebenico Port and channel may be recognized from the offing by an interruption in the line of islands and islets which almost continuously border the Dalmatian coast; also, by Zuri, the outermost of the group of islands off it, and, on a near approach, by Capočesto village church, which is visible at a considerable distance.

Jadria Point lighthouse should be approached when bearing 3° , passing between it and Kobila Rocks beacon, thence in mid-channel to the anchorage in Port Sebenico. It presents no difficulty in a steamer.

Anchorage.—Vessels anchor where convenient a little north-westward of the harbor light. Here there are several white mooring buoys, but they do not allow swinging rooms for large vessels.

There is also good shelter in San Pietro Bay in 10 to 12 fathoms, mud. There are a number of mooring and warping buoys in San Pietro and Maddalena Bays. In Kerka Inlet the water is much deeper, and vessels must be careful to avoid the telegraph cable.

The Bora is severely felt here, but the port is a good commodious anchorage.

Prohibited anchorages.—Vessels are prohibited from anchoring on a line 15° of Kulina Point in the vicinity of a submarine water conduit, the landing points being marked by notice boards with reversed anchors painted on them.

To prevent Jadria Point Light being obscured, vessels are prohibited from anchoring in the western approach to San Antonio

Channel in the area included between the bearings 34° through east to 90° of that light.

Tides.—It is high water, full and change, at Port Sebenico, at 4h. 38m.; springs rise 6 inches.

The town of Sebenico is approached from the sea by the San Antonio Channel, and is in the form of an amphitheater and picturesquely situated close to the water at the base of the barren Taro Mountain, which, at $3\frac{1}{2}$ miles inland, rises 1,627 feet above the sea. It was formerly considered the strongest city of Dalmatia, and in 1807 was unsuccessfully besieged by 40,000 Turks, but the town and fortifications are now almost in ruins; the cathedral is reckoned the oldest and finest in Dalmatia. The civil population was about 13,000 in 1912, who cultivated the vine and olive on a not very fruitful soil and exported horses and cattle to Naples from Bosnia.

Sebenico is in railroad communication with Spalato, the line passing through the valleys inland from the one port to the other; and also with Knin, 25 or 30 miles in the interior, the line to this place branching off from the Sebenico-Spalato line. There is also a high road leading to Zara, Spalato, and the interior of Dalmatia.

Coal and supplies.—The Austrian Government formerly kept about 6,000 tons of Welsh coal here. Coal from the mines of Monte Promina can be obtained, about 2,000 tons being usually in stock, but it is very sulphurous and for steaming purposes must be mixed with other coal. It is put on board vessels alongside the embankment; lighters are scarce. There are no other supplies of any consequence except water, which is good and plentiful.

There are two electric travelling cranes on the coaling wharf for loading coal, and there are three lighters of from 10 and 15 tons. The water can be obtained from hydrants on the town quay.

Time signal.—A gun is fired at noon, Standard Time, or 23h. 00m. 00s. Greenwich mean time, daily, from Santa Anna Station.

Radio.—A radio station at Sebenico is always open to the public; the call letters are O.H.B.

Kerka River empties itself into the Proklian Lake and from thence to the Kerka Inlet at the northwestern part of Port Sebenico; its source is at the base of the Dinara Mountains and after receiving several mountain torrents it forms a celebrated waterfall about 2 miles above Scardona, which place is about 9 miles distant from Sebenico by water. It is navigable by small vessels up to Scardona, near which place are the coal fields of Dubrovica.

Scardona is now a village, but was once a large and handsome town, between which and Bosnia there is still considerable commerce and a small steamer plies daily between it and Sebenico.

Lake Proklian, which receives the waters of the Kerka, produces the skilli, a fish highly esteemed, and communicates with the basin of Sebenico 3 miles above the town.

In 1883 the British naval vessel *Helicon* anchored in 17 fathoms at the head of Kerka Inlet Port Sebenico at the junction of Zaton Creek with the stream from Proklian Lake. Her boats ascended to the waterfall about 2 miles above Scardona. The turnings are reported to be very sharp and difficult for even a small vessel below Scardona; above that village a deep and navigable channel for boats only exists quite up to the falls, which are well worth a visit. Just above Scardona the river is spanned by a telegraph wire about 80 feet above the water.

Kerka River is navigable to the foot of the falls.

Proklian Lake—Lights—Vukinac Point.—A fixed red light is exhibited at 13 feet above high water from a red iron pillar 14 feet high on Vukinac Point, the inner northern entrance point of the channel leading from Kerka Inlet into Proklian Lake and should be seen 3 miles.

Ostrica Point.—A fixed red light is exhibited, at 13 feet above high water from a red iron post 14 feet high on Ostrica Point, the southern entrance point of Kerka River, in Proklian Lake, and should be seen 3 miles.

Port Sebenico Vecchio (lat. $43^{\circ} 38' N.$, long. $15^{\circ} 56' E.$) (Old Port), 6 miles southward of Sebenico, is formed between a long hilly peninsula southward of the Sebenico Channel and the mainland on the south; it is a narrow inlet about $2\frac{1}{2}$ miles deep, with a depth of 25 fathoms at the entrance and 12 fathoms about $1\frac{1}{2}$ miles inside, where large vessels anchor. Northwesterly winds raise a heavy sea near the entrance. This port is not often visited, owing to the vicinity of Port Sebenico, which is preferred to it. There is a village at the head of the inlet.

The island of Plana, 108 feet high, lies off the southern point of entrance.

Sebenico Vecchio may be recognized by a long ancient wall on the heights; in entering it a small vessel, under favorable circumstances, may pass on either side of Plana Island. A rocky bank with $3\frac{1}{2}$ fathoms lies just southward of the southwestern point of Plana and the southern point of entrance to the inlet is bordered by shallow water and a rock.

Port Capočesto, about 3 miles southward of Sebenico Vecchio, is between the point on which Capočesto village stands and the sugar-loaf shaped peninsula to the southward terminating in Kremik Point. It is a semicircular bay about $\frac{1}{2}$ mile wide and the same deep, with 12 to 16 fathoms water in the center. It is a good, although a small port and vessels secure to the shore.

Lights.—A flashing white light is exhibited, at 33 feet above high water from a red conical iron turret with a gallery 28 feet high on Kremik Point and should be seen 11 miles. For the arc of visibility, see Light List.

A fixed red light is exhibited at 17 feet above high water from an iron lamp-post 16 feet high on Capočesto Molehead and should be seen 3 miles.

Telegraph.—Capočesto is connected with the general telegraphic system.

Capočesto Islets.—Between Capočesto and Planka Point, at 6 miles south of it, there are several islets, rocks, and shoals known by this name. The largest of them, Maslinovac, 131 feet high, is about 1 mile southwestward of the village and $\frac{1}{2}$ mile westward of Kremik Point. Vessels bound to Capočesto from the southward usually pass between this island and Kremik Point. A rocky shoal with $2\frac{1}{2}$ fathoms water lies in the fairway of this passage and may be avoided either by keeping close to the eastern side of the above islet or to the main coast near the entrance of Port Peles.

Shoals—Beacon.—Grgovac Islet, 1,400 yards westward of Maslinovac, has a shoal with less than 1 fathom nearly 600 yards 150° from it; on this shoal, erected in 5 feet water, is a beacon consisting of an iron staff with an open-work ball surmounted by an iron flag, the whole being 28 feet high and painted white.

Grgovac has also a patch with $3\frac{1}{2}$ fathoms about $\frac{1}{4}$ mile off its north-eastern side, and a rocky bank with 5.3 fathoms lies $1\frac{1}{4}$ miles 229° of it.

When bound to Capočesto from the southward, unless in a small vessel and with good local knowledge, it is prudent to leave all these islets and shoals on the starboard hand.

Port Peles (lat. $43^\circ 34'$ N., long. $15^\circ 56'$ E.).—This small inlet, close southward of Kremik Point, has a depth of 7 fathoms, muddy bottom, in the middle of its northern branch, where small craft may moor in safety. The southern branch is more contracted and less secure, and is fit for boats only, which should moor under one of the points projecting from the southern shore, to shelter themselves from the sea sent in by westerly winds.

Port Rogoznica is a spacious bay, $1\frac{1}{2}$ miles northward of Planka Point, nearly circular and surrounded by barren hills. The entrance is between Beli hrt Point on the northern side, and Konja Point on the southern side, where there is a mid-channel depth of 34 fathoms. The bay is divided into two parts by Rogoznica Islet, on the north-western side of which is the village; there is a white mooring buoy abreast the village. The passage northward of Rogoznica Islet is navigable, a ruined dam which obstructed it having been removed.

Vessels anchor westward of the village in depths of 12 to 17 fathoms, or between the northern part of Rogoznica Islet and the shore eastward of it, in 15 to 17 fathoms, mud, sand, and weed; or farther up, in 10 to 12 fathoms. Vessels may safely heave down in this port for repairs. Small craft moor on the western side of the islet and secure to the shore at the southern part of the village. Port Rogoznica is safe in all winds and the entrance is easy. The surrounding country is very barren. Fossil remains are numerous at Rogoznica; also at several of the islets in its neighborhood. Water may be procured from the mainland.

Lights.—A fixed red light is exhibited, at 50 feet above high water, from an iron lamp-post, 16 feet high, on Point della Madonna, and should be seen 3 miles.

A fixed green light is exhibited, at 19 feet above high water, from an iron lamp-post, 16 feet high, on the southwestern end of the quays at Rogoznica, and should be seen 2 miles. The light shows white toward the village.

Telegraph.—Rogoznica is a telegraph station.

Mulo Islet, a little more than 100 yards in diameter and 28 feet high, is the outer islet off Port Rogoznica, and lies $1\frac{1}{2}$ miles westward of the entrance. It is nearly steep-to except on the northern side, which is rocky 100 yards off, and has on it a white lighthouse.

Light.—A group occulting white light is exhibited, at 77 feet above high water, from an octagonal stone tower, 58 feet high, with dwelling attached, on the summit of Mulo Islet, and should be seen 14 miles.

Spaun Rock.—Nearly 1 mile 341° from Mulo Lighthouse is a rocky shoal about 300 yards in extent, with from 2 to 3 fathoms on it and from 6 to 8 fathoms around; the Spaun Rock, with 2 fathoms, is in the center of the shoal. The southern extremity of Rogoznica Islet on with Point della Madonna leads 600 yards northward of the rock. To pass southward of the rock, keep the northern extremity of Konja Point in line with the north extremity of the northern Smokvica Islet, and pass within $\frac{1}{2}$ mile of Mulo Lighthouse.

Spaun Rock—Buoy.—A white conical buoy, surmounted by a spherical cage, is moored on the northern side of Spaun Rock.

Svilan Islet lies about a mile northwestward of Spaun Rock; a shoal with $2\frac{3}{4}$ fathoms water lies off its southeastern end.

Smokvica Islets (lat. $43^\circ 31' N.$, long. $15^\circ 56' E.$) are two islands off Konja Point, about 300 yards apart, with a depth of from 7 to 14 fathoms between them; the southern islet is the larger of the two and is 157 feet high. Shallow water extends more than 200 yards from the northwestern end of each islet, and $296^\circ 700$ yards from the center of the northern islet is a rocky 3-fathom patch.

Northeastward of the southern end of the larger Smokvica is the little islet Kalebinjak, having a deep passage about 400 yards wide into Port Rogoznica between it and the mainland.

Directions.—To approach Port Rogoznica, the entrance of which is open to the westward, a large vessel should pass outside the islets. To enter northward of the Spaun Rock, the southern end of Rogoznica Islet shut in with Point della Madonna Lighthouse until Mulo Lighthouse bears about 183° leads well clear of it, and the same line leads to the entrance; then steer in midchannel or as convenient.

To approach the port southward of the Spaun Rock, steer for Mulo Lighthouse, pass at a prudent distance on either side of it, and then, in order to avoid the 3-fathom patch northwestward of Smokvica Islets, bring Mulo Lighthouse to bear 217° and steer 37° until the southern end of Rogoznica Island bears 105° ; then steer for it. A small vessel may take the narrow passage between Konja Point and the islets off it, but should guard against the current and be prepared to anchor if necessary.

CHAPTER VIII.

COAST OF DALMATIA FROM PLANKA POINT TO STAGNO PICCOLO, AND ADJACENT ISLANDS.

Coast from Planka Point to Stagno Piccolo includes an extent of about 100 miles of the Dalmatian coast, which coast presents a diversified appearance of fertile well cultivated country, and of dry, barren shores, with high bare-topped mountains in the rear.

The islands eastward of Planka Point, instead of trending parallel with the coast as those described in the previous chapter, lie more at an angle with it, in an east and west direction. The olive and the vine are cultivated on them, and fishing is carried on in the numerous and productive channels. Few of the islands afford fresh water.

Planka Point (lat. $43^{\circ} 29' N.$, long. $15^{\circ} 58' E.$), lying $2\frac{1}{2}$ miles southeastward of Mulo Lighthouse, is composed of white rocks, and, like the adjacent shores, is steep and inaccessible; off it is a low rock nearly even with the water's edge. On its southern extremity are the ruins of a small church, and close to the northward, but separated from Planka Point by the small but deep inlet named Planka Cove, is Mount Movar, of barren and whitish aspect, surmounted by a stone column 432 feet above the sea. Sailing vessels often make this point in their way up the Adriatic, but the currents are rapid in its vicinity and sea winds cause considerable eddies around it.

Trau Vecchio Bay (lat. $43^{\circ} 29' N.$, long. $16^{\circ} 02' E.$).—Between Planka Point and the Zirona Channel 3 miles farther east, there are three rather deep bays named Sicinice, Manera, and Trau Vecchio, with steep rocky shores, which afford shelter from all but westerly winds. Trau Vecchio, the easternmost, is the largest and best; it is open to the southwest, and affords anchorage in depths of 11 to 17 fathoms, sand. Three or four small islets front these bays, of which St. Arcangelo, 295 feet high and the largest, lies about a quarter of a mile off the southeastern point of Trau Vecchio Bay.

There are safe passages between the two small Muja Islets westward of San Arcangelo Islet, between them and the latter islet, and also between them and the coast.

San Arcangelo Islet is a good distinguishing mark for the bay, being covered with trees and having on its summit a black triangular framework beacon surmounted by a square; on its eastern slope are

tower and the ruins of a chapel. At the head of Trau Vecchio Bay are the ruins of ancient Trau.

If in a small sailing vessel, when running from the northward for shelter eastward of Planka Point, the Trau Vecchio Anchorage be missed, proceed through the Zirona Channel to Port San Giorgio, in Great Zirona Island, on the south side of the channel.

Port Mandoler (lat. $43^{\circ} 29' N.$, long. $16^{\circ} 07' E.$) is a narrow inlet in the mainland opposite Great Zirona Island; it recedes about a mile in a northwesterly direction and affords shelter to small vessels from all winds in depths of from 4 to 10 fathoms abreast some dwellings on the northern shore. Off the mouth of the port is Mandoler Rock, 10 feet high, on either side of which vessels may pass on entering.

Little Zirona Island, on the south side of Zirona Channel, is nearly $2\frac{1}{2}$ miles in extent east and west, 262 feet high, barren at the summit, with cultivated patches below. It is steep-to except on its northwestern side, which is foul. Temporary shelter from a Bora may be obtained in Rina Road, under its southwestern side, in a depth of 8 or 9 fathoms, sand and weed.

Great Zirona Island is 3 miles in length east and west, and its northeastern part is 580 feet high. It resembles Little Zirona as to cultivation of the lower grounds and barrenness above. Off the eastern extremity are two small islets close to the shore, connected with it and with each other by shallow water; elsewhere the coast is quite clear. There are about 2,000 inhabitants, who cultivate the vine, fig, and almond.

Port San Giorgio (lat. $43^{\circ} 27' N.$, long. $16^{\circ} 08' E.$), on the northwestern side of Great Zirona Island affords good anchorage. Vessels of moderate size anchor near the middle of the port in depths of from 13 to 16 fathoms, sand, and secure to the shore. The two entrance points are high and covered with trees; on the southern shore is a church which is visible at some distance. The town is at the head of the port; here water and provisions in small quantities may be procured. A red light is exhibited from an iron lamppost, 17 feet high, on the quay in Port San Giorgio.

Malta Islet, 90 feet high, lies about $1\frac{1}{2}$ miles westward of the southern point of entrance to Port San Giorgio.

Zirona Channel is the passage between the Zirona Islands and the mainland; it is about 1 mile wide, with deep water. At the western entrance is a 9-fathom patch, and the small islet Murvica, 92 feet high, has round it shoal water extending about 100 yards.

Murvica Light.—On the summit of Murvica Islet an occulting red light is exhibited from a quadrangular tower on the side of a dwelling, 23 feet high, at an elevation of 48 feet above the sea, showing light 4 seconds, eclipse 1 second, visible 12 miles.

Directions.—In entering from the westward a vessel should pass between Murvica Islet and Little Zirona, that being a straight course, but the shore of the mainland is everywhere clear and bold. Coming from the eastward, the shore of Great Zirona Island should be closed in order to leave on the starboard hand the Kluda chain of small islets and rocks fronting the entrance to Bossiljina Bay. Violent squalls reach this channel, especially in southeasterly winds, and these winds greatly accelerate the current through it.

There is a passage between the two Zirona Islands, but it is seldom used as the current causes considerable eddies in it.

Trau Bay and approach.—Trau Bay is 6 miles in length, from 1 mile in breadth, and about 1 mile wide in the entrance, which is deep. The Kluda and other islets lie in the approach, but within the entrance, at either end of the bay, there is secure anchorage.

Kluda Islets.—This chain of small islets and rocks, extending eastward and westward over a space of $1\frac{3}{4}$ miles, lies on the northern side of the Zirona Channel opposite the eastern end of Great Zirona Island, and in front of the entrance to Trau Bay. The largest islet, named Kluda, is at the western end of the group, and is 164 feet high. The others are named Galera, Piavice, Zaporinovac, and Balkun; they should not be approached too closely. At $\frac{3}{4}$ mile westward of Kluda are two shoal heads with 5 and $5\frac{1}{2}$ fathoms water.

Galera Light.—From an iron turret 27 feet high on the summit of Galera Islet, about $\frac{3}{4}$ mile east-southeast of Kluda, a group flashing light (unwatched) 2 flashes every 6 seconds, is exhibited at an elevation of 37 feet above the sea, visible 8 miles.

Santa Eufemia Islet lies on the east side of approach to Trau Bay, near the southwestern extreme of Bua. The anchorage northward of the island is frequented by small craft which anchor in depths of 7 to 9 fathoms. This anchorage is convenient for vessels meeting a contrary wind in the Spalato Channel; it has an eastern and a western entrance, the former is over the shallow 2-fathom bank which unites Santa Eufemia with Bua Island.

Krabjevac Islet, 111 feet high, westward of Santa Eufemia, is connected to the latter by a flat with 3 fathoms over it.

The Celini Rock (lat. $43^{\circ} 30' N.$, long. $16^{\circ} 12' E.$), 45 feet high, with four shallow rocky patches, encumber the entrance to the bay, especially for vessels of deep draft; the passage in is between the Celini Rock and a 4-fathom patch on the one side and Okrug Point, the western end of Bua, from which a shoal extends 200 yards westward, on the other. The shoal patches northwestward of Celini Rock have 5 and 2 fathoms water; the latter depth is near the northern shore. A light is exhibited from the summit of the rock. (See Light List.)

Bossiljina Bay is the western arm of Trau Bay, extending westward about 3 miles, and generally about $\frac{1}{2}$ mile wide. It is completely sheltered by the high land which rises 938 feet above the sea $1\frac{1}{2}$ miles westward of Jelinac Point at the entrance, and its shores are backed on the north by high, wooded, mountainous land, the seaward slopes of which are planted with vines and olive trees. The village is at the head of the inlet.

In the middle, about halfway in, the depth is 20 fathoms, from which the decrease is gradual toward the village. Vessels anchor halfway between the two shores in 7 or 8 fathoms. Small craft moor in the various little creeks and abreast of the village.

It is difficult with contrary winds to work into this bay, in consequence of the off-lying islets and rocks outside and within the entrance, and impracticable for a sailing vessel to quit it with winds between northeast and southeast. For these reasons Bossiljina Bay is seldom visited by other than coasters. The passage into the bay is about $\frac{1}{2}$ mile wide between Jelinac Point and Celini Rock and the shoals northeastward of that point.

Light—Bossiljina.—A light is exhibited from an iron conical turret on Bossiljina Point on the southern side of the bay about $\frac{3}{4}$ mile from its head, and one from the quay at Bossiljina. (See Light List.)

Bua Island forms the eastern side of Trau Bay, is about $8\frac{1}{2}$ miles in length east and west, and in the center 715 feet high; it is connected with the town of Trau, which stands on an islet connected with the mainland by a swing bridge. Its appearance presents nothing remarkable; the higher parts are rocky and bare, the lower ground is well cultivated and produces wine, oil, fruit, and vegetables. It has four villages and about 1,600 inhabitants. On the western side of the island is a cove where a great quantity of asphaltum exudes. The southern coast, which trends nearly parallel with the mainland, is rocky and steep almost throughout, with deep water close-to.

Saldon Bay, the eastern arm of Trau Bay, on the northeast side of which is the town of Trau, communicates with the Canale Castelli by the Trau Channel. Vessels of deep draft anchor near the middle of Saldon Bay in a depth of 14 fathoms, mud and gravel, with Zubrian Point (San Cipriano Point) Light bearing about 346° . Small vessels find good anchorage under the northern and southern shores. Shoal water ($2\frac{1}{2}$ fathoms) extends nearly 100 yards southward of Zubrian Point.

Trau Channel, with depths of $2\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, is the narrow channel which connects Trau Bay with Canale Castelli northward of Bua Island, over which is a swing bridge, as before stated; the depth under it is sufficient to permit vessels of about 15 feet draft

to pass through. The narrows is marked by stakes, white on the northern side, red on the southern. Near the western entrance a white pile beacon is surmounted with a circular disk, and a red buoy about 600 yards to the westward of the swing bridge marks the southern side of the channel. The channel is being improved by dredging. Vessels of light draft anchor here over muddy bottom, and with stern fasts to the island.

Trau, ancient *Tragurium* (lat. 43° 31' N., long. 16° 15' E.), is built on an islet connected with the mainland by a bridge over a narrow passage in which there is a depth of 6 feet at low water; it is also connected with Bua Island by means of two jetties, one projecting from Trau, the other from the island, joined by a swing bridge. Trau is surrounded by ancient walls and defended by a castle of some strength. The neighboring county is well cultivated and picturesque; the inhabitants, about 4,000, are industrious and many of them good sailors. Surrounding marshes render the atmosphere insalubrious.

The trade is in wine, oil, and vegetables; water and provisions may be obtained, and vessels may refit here.

A light is exhibited from the pier extending 30 yards westward from Zubrian Point. (See Light List.)

Two small fixed lights are shown from the bridge which joins Bua Island to Trau; these lights show green when the bridge is shut, and red when it is open.

Telegraph.—Trau is a telegraph station.

Directions.—When approaching Trau Bay from any quarter, Mount Vlaska, 2 miles northwestward of Trau and 1,453 feet high, one of the highest points on the Dalmatian shore, will be readily recognized. It is of barren aspect and surmounted by the ruins of a telegraph tower.

Approaching from the westward vessels may keep close along shore until abreast of Jelinac Point, whence proceed as below directed for coming from the southeastward.

When approaching from the southeastward by the Spalato Channel the opening between Jelinac Point on the west and Okrug Point on the east will be readily recognized. After passing the Macina Shoal, which lies near the center of the Spalato Channel, Okrug Point should be steered for, and the three islets—Santa Eufemia, Krajevace, and Zaporinovac—left on the starboard hand, the latter being passed close-to in order to avoid Balkun Rock or Islet lying $\frac{1}{2}$ mile westward of it. When the hilly Vranica Point, which is on the right of the entrance to Bossiljina Bay and immediately opposite the passage, is seen it should be steered for, and the Celini Rock will soon be visible; the latter should not be passed too closely, but

should be left on the starboard hand if bound to Bossiljina Bay, and on the port hand if going to Trau or Saldon Bay.

If proceeding to Trau a vessel should round Okrug Point about 600 yards to pass between the spit extending from the point and Celini Rock dangers, whence course may be shaped for Trau, if bound there. When approaching Trau Channel give Zubrian Point a berth of 200 yards to avoid the shoal extending from it. Vessels may anchor in the fairway in 5 fathoms, 300 yards eastward of the point. Farther in the water becomes shallow, but vessels of 15 feet draft can pass through the channel into the Canale Castelli.

Canale Castelli Bay is landlocked, with general depths of 10 to 20 fathoms, formed within the northeastern side of Bua Island and the northwestern side of Spalato Promontory; it extends from the village of Vranica on the east to the town of Trau on the west, a space of about $9\frac{1}{2}$ miles. The northern coast is bordered by a bank extending more or less from the shore and numerous rocks and shoals encumber the eastern part of the bay, rendering caution necessary in approaching Vranica or Port Paludi. It is sheltered from the violence of northerly winds by the high land near the coast, but is not free from Bora gales; the shore of Bua Island between Jove Point, its eastern extremity, and the town of Trau, being quite exposed affords no shelter.

Salona (lat. $43^{\circ} 32' N.$, long. $16^{\circ} 29' E.$), at the eastern extreme of the bay, stands on the ruins of ancient Salona, the birthplace of Diocletian, and is now an insignificant but picturesque village. The small river Salona, which is navigable for boats and whose source is at the foot of the Klissa Mountains, discharges here. There are several villages along the coast of the bay with "Castel" preceding the name, hence the name of the bay.

A stone beacon 6 feet high, standing in about 5 feet of water, is said to mark a shoal about 45 yards westward of Castel Vecchio, one of these villages.

A rocky shoal with $3\frac{1}{2}$ fathoms water lies half way between the eastern extreme of Bua Island and the town of Trau and about 1,100 yards from the shore of Bua. Westward of this shoal the shores on either side converge and are bordered by banks forming the Trau channel.

Castelnuovo—Harbor light.—From the molehead of Castelnuovo, 1 mile westward of Castel Vecchio, north side of the bay, is exhibited a fixed red light visible 2 miles, between the bearings 270° and 42° .

Galera Islet—Beacon.—About $\frac{1}{2}$ mile northward of the northern point of Paludi Bay is the Galera Islet, 6 feet high, on the eastern end of a shoal about $\frac{1}{2}$ mile in length. A shallow spot marked by a beacon is situated near the middle of the north side of this shoal.

Scille Rock Light.—From Galera Rock to the anchorage northward of Vranica village the center of the channel is clear except for a sunken rock, marked by Scille Rock Light. (See Light List.) In anchoring give a berth of 300 yards to the rocks on the northern side of the anchorage.

Port Paludi.—The bay on the northern side of the Spalato Promontory under Mount Marian is named Port Paludi; it is bordered all round by shallow water, which from the northeastern point extends nearly $\frac{1}{2}$ mile southwestward with a depth of 1 fathom at its extremity, marked by an iron perch surmounted by a white skeleton ball 18 feet above the water.

There is also a rock about 6 feet high 400 yards westward of the northeastern point, with from 4 to 6 fathoms water between it and the land.

Within the shoal there are depths of from 4 to 6 fathoms, and anchorage for small vessels in the northeastern part of the bay about $\frac{1}{4}$ mile off the jetty, from which a road leads to the town of Spalato, about 1 mile distant on the southern side of the peninsula.

Large vessels anchor about $\frac{1}{2}$ mile from the rock, and $\frac{1}{2}$ mile northward of the southwestern point of the bay, in about 17 fathoms, mud.

Directions.—The entrance from seaward to the Canale Castelli is between Jove Point, the eastern extreme of Bua, and San Giorgio Point, the western extremity of the Spalato Promontory, where 3 fathoms water will be found 100 yards from the point, and a depth of about 25 fathoms in mid-channel. This entrance is about 1 mile wide and free from danger, but in working through in bad weather a vessel should be prepared for heavy squalls from the high land.

The position of the bay is plainly indicated by Mount Marian, 598 feet high, rising from the Spalato Promontory $1\frac{1}{2}$ miles eastward of San Giorgio Point. The mount is barren and appears from the offing to be detached from the adjacent land. The tower of the convent church at Paludi is visible from a considerable distance.

As previously stated, the passage from the Canale Castelli through the Trau Channel can be taken by vessels up to 15 feet draft.

Port Spalato (lat. $43^{\circ} 30' N.$, long. $16^{\circ} 26' E.$) is 2 miles eastward of the entrance to Canale Castelli; the intervening shore is rocky and steep-to, except a small shoal extending from the point about $\frac{3}{4}$ mile eastward of San Giorgio Point.

The port of Spalato is about 1,200 yards wide and 800 yards deep, with a depth of 4 to 5 fathoms, mud, in the center, shoaling to $1\frac{1}{2}$ fathoms, rocky bottom, at 200 yards from its head, and a similar depth at nearly the same distance from the western shore, which is irregular and rocky.

From the eastern point of entrance a mole projects about 540 yards toward the western point, affording great protection to the port;

from the inner end of the mole a wall extends along the eastern shore of the port and terminates at a shorter inner mole jutting out westward from the site of the barracks.

Two large jetties are built out, 200 and 160 yards, respectively, from the eastern shore, alongside which the depth is from 18 to 24 feet. From the western part of the town another small mole projects toward the inner mole, leaving an opening rather more than 200 yards wide into a small inner harbor faced with quays, in which the depth is from 6 to 12 feet.

Town.—The town of Spalato, which contains within it the ruins of the palace of Diocletian, is the capital of the department of Spalato and the most important town of Dalmatia; its population in 1912 numbered 13,000. It is in direct railway communication with Sebenico and also with the town of Knin, some 25 or 30 miles in the interior, by means of a line branching off at Perkovic from the Spalato-Sebenico line. The adjacent country contains several suburbs, is very fertile, and richly cultivated.

The outer walls of Diocletian's Palace, which form a square, still in great part exist, and inclose a large part of the town. The cathedral or duomo is a most remarkable and conspicuous building; it is octagonal with a curious portico around it, while within are two ranges of columns of granite and porphyry, one above the other, with a gallery between them in which a whispering echo is observed. Other considerable remains of imperial buildings are seen within the precincts of the town.

Trade.—Horses, cattle, wool, cotton, silk, figs, beeswax, and copper are the exports; timber for shipbuilding is grown, and near the town among the vines is the wild cherry from which is extracted the marashino of Zara. Spalato is the chief outlet for the produce of Bosnia and is defended by imposing fortifications. In 1912, 5,443 steam vessels of 1,593,208 tons and 935 sailing vessels of 44,390 tons entered the port of Spalato. There is telephone communication with Trau.

Outer anchorage.—The roadstead of Spalato affords anchorage in depths of from 22 to 27 fathoms at a distance of 400 to 1,200 yards southward of the breakwater, over a good mud bottom, but it is not a desirable anchorage in the winter. Paludi Bay is better at that season, as the Bora is less felt there.

Outer Molehead Light.—From a gray iron octagonal tower 31 feet high, 8 yards within the head of the Botticella Point Mole, a group-flashing light, visible 11 miles, is exhibited at an elevation of 34 feet above the sea.

Fog signal.—A fog signal has been established at above-mentioned light.

Inner Eastern Molehead Light.—On the Inner Eastern Molehead a small light is exhibited, elevated 17 feet above the sea and visible 1 mile.

San Pietro Mole Light.—A light, elevated 17 feet above the sea, visible 1 mile, is exhibited from the head of San Pietro Mole. (See Light List.)

Miovo Mole Lights.—Lights are exhibited from the north and south corners of Miovo (San Doimo) Mole.

Anchorage—Buoyage.—Botticella Bank, in the southeastern corner of the port, is marked by four buoys. The shallows extending from the shore are marked by quadrangular beacons or buoys with the depth in which they are moored painted on them. Several mooring buoys are also laid down for warping or making fast to; the two nearest the railroad station are meant exclusively for the Austrian Lloyd's steamers; those close inshore are only for small vessels. The port affords anchorage in depths of 4 to 5 fathoms, mud and shells. Anchorage is prohibited in Port Spalato northwestward of a line joining San Stefano Point and the northwestern extremity Veneto (the inner eastern) Mole.

Directions.—Mount Marian, on the west, and Klissa Castle, about 5 miles northeastward of Spalato, on the east, are good guides to the port at a distance; on a nearer approach the numerous edifices and steeples of the town will be seen. There is no difficulty whatever in entering the port.

If a vessel surprised by a bora in this neighborhood should be unable to reach either Spalato or an anchorage in the Canale Castelli, she should bear up for the western side of Brazza Island.

Telegraph.—Spalato is a telegraph station.

Coal and supplies.—Coal from the Promina mines may be obtained, about 3,000 tons being usually in stock; this coal is full of sulphur, and unless mixed with good coal is almost useless for steaming purposes. About 18,000 tons of English coal is imported annually. The depth alongside the coal wharf is from 16 to 19 feet. Water and provisions may be procured in abundance, and there are facilities for heaving down and repairs. A hydrant for the exclusive use of the Imperial and Royal Navy, from which other vessels of war can supply themselves free of cost with excellent drinking water, is situated near the wooden landing and opposite the railroad station. Application should be made to the harbor office.

Solta Island (lat. 43° 23' N., long. 16° 16' E.), the next large island southeast of Great Zirona, is 10 miles in length and averages about 2 miles in width, except toward its southeastern end, where it is narrower. It consists of numerous rocky hills partially wooded. Mount Straza, 682 feet high, about $\frac{1}{3}$ from the western end and on the

southern side, has on it the remains of a telegraph station, but its highest part is Mount Superior, 777 feet above the sea, about $\frac{1}{4}$ from the southeastern end.

Solta contains about 3,200 inhabitants; it has some excellent pasturage and many parts are well cultivated, producing wine, oil, and also honey of exquisite flavor.

Along the southwestern coast, which is rocky and steep, are many little coves, but so completely exposed to sea winds as to afford no shelter whatever.

At the western extremity, off which are several rocky islets, are two inlets; in the northernmost, small vessels find shelter from all weather, and off the southern, between the points of the bay and Balkun Islet, there is temporary anchorage for small vessels during northerly and easterly winds.

Port Oliveto, ancient Olynta (lat. $43^{\circ} 24' N.$, long. $16^{\circ} 12' E.$), is the more northern of these two inlets and the village of Oliveto is at its head. When bound to this port from the northward, the passage between Stipanska and Zelebranjak Islets should be taken and the vessel should keep along the western side of the latter and haul to the eastward after passing it.

Stipanska, 223 feet high, is the largest and outermost of this group of islets and is planted with olive trees.

When bound to the port from the southward, Balkun Islet, 174 feet high, should be steered for and the passage taken between it and San Nicolo Point, the high point of Solta, on which is a church and at its foot a lighthouse. Rotol, the southwestern islet of the group, should be allowed a berth of more than 200 yards in passing. The little islet of Kamicic, 61 feet high, has a spit extending from its western side.

Port Oliveto Light.—On San Nicolo Point, the southern point of entrance to Port Oliveto, is exhibited from a white stone lighthouse and is visible 3 miles.

In approaching Oliveto from the Solta Channel this light is visible through the narrow and shallow passage between Solta and Zelebranjak Islet, but the channel to be taken is that between Zelebranjak and Stipanska Islets.

Karober Cove (lat. $43^{\circ} 24' N.$, long. $16^{\circ} 18' E.$) is an inlet about the middle of the northern coast of Solta and is frequented by coasters which anchor in the center of it and secure to the shore near some storehouses. A mooring buoy is placed about a cable northwestward of Glavica Point. The position of the cove is easily recognized by a precipitous hill 669 feet high and covered with vines, contiguous to a tract of low land; and nearer the coast a grotto will be seen westward of the port.

Port Karober Light.—From an iron standard on Glavica Point, western side of Port Karober, a light is exhibited, visible 5 miles. (See Light List.) The light in sight leads eastward of Macina Shoal.

Port Sordo (lat. $43^{\circ} 23' N.$, long. $16^{\circ} 19' E.$), just eastward of Karober Cove, has more room and is used in southerly and westerly winds by larger vessels than those frequenting the latter. The port is nearly 1 mile in length; the anchorage is in depths of from 9 to 15 fathoms, mud, and is somewhat protected from northeasterly winds.

Stomoska (Stomorska) Cove Light.—A light is exhibited on the western side of the cove, which is situated about $1\frac{1}{4}$ miles south-eastward of Port Sordo.

There is a post and telegraph office at Stomoska.

The northern coast of the island is exposed to the full force of northerly and northeasterly winds, and the two last-mentioned ports are the only places affording any shelter whatever.

Solta Channel.—In taking this channel between Solta and Great Zirona Islands to the Spalato Channel, the eastern extremity of the latter island should be avoided as the current, which is rapid and irregular in branching off to the Zirona and Solta Channels, sometimes sets on it.

The water is deep with the exception of a rocky $3\frac{1}{2}$ -fathom shoal in the fairway about midway between Stipanska and Macaknar Islet, and a $5\frac{1}{2}$ -fathom patch in the northern part of the channel, 1,200 yards 158° from Karknjase Islet.

The best channel is between the $3\frac{1}{2}$ -fathom patch and Stipanska Islet, toward the latter, after passing which Solta should be closed in order to avoid being carried by the current toward Macina Shoal.

Spalato Passage, which is the shortest route from the southward to ports in the Spalato Channel, separates Solta and Brazza Islands. Being less than 800 yards wide it is of rather difficult navigation in a sailing vessel with contrary winds when the current is strong. The least mid-channel depth is 13 fathoms, but the shore on either side should not be approached within 100 yards, the Brazza side being preferred. When passing through from the southward, Smerduglia Islet, 22 feet high, will be seen through the pass at the northern entrance.

When making for this passage from the Spalato Channel it is customary to pass westward of Smerduglia Islet.

Lights.—On Speo Point, 600 yards northward of Jaja Point, the southwestern extremity of Brazzo Island and the southeastern point of entrance to the Spalato Passage, a light is exhibited, visible 10 miles.

Cape Livka.—An occulting light is exhibited on Cape Livka, the eastern extremity of Solta Island. (See Light List.)

Spalato Channel.—The width of this channel between Zirona and Solta Islands on the south and Bua and the coast of Spalato on the north renders it easily navigable, the current, which sets westward, not being very strong. The average depth is about 30 fathoms and the bottom throughout is mud.

Macina Shoal.—This rocky shoal, with less than 1 foot water over it, is the only danger in the channel; it lies nearly opposite the northern entrance to the Solta Channel, about midway between the shore of Solta Island and Santa Eufemia Islet, is of small extent, and is surrounded by deep water. A small shoal with a depth of 6 fathoms lies 290° nearly $\frac{1}{2}$ mile from Macina Shoal.

Beacon.—A white iron staff with skeleton ball at present marks Macina Shoal, but in this exposed position well-constructed beacons have so often been washed away that its existence should not be depended on.

The coast between Port Spalato and Stobrez village, 4 miles eastward, is inaccessible and bordered by high land; about midway, a few yards from the shore, is a small 5-fathom shoal supposed to be the remains of an ancient dock. Between the village and a point 2 miles westward of it, there is a ridge which extends $2\frac{1}{4}$ miles southwestward, with general depths of 6 to 10 fathoms; but at 1 mile from the shore there is a patch of $4\frac{1}{2}$ fathoms and at nearly 2 miles from the shore, a patch of $5\frac{1}{2}$ fathoms. About $\frac{3}{4}$ miles eastward of the tail of this ridge is a bank with from $6\frac{1}{2}$ to 10 fathoms water, and a patch with 7 fathoms at 1 mile southwest of the latter.

Stobrez Cove.—Stobrez village (lat. 43° 30' N., long. 16° 31' E.), the site of the ancient Epezio, stands on a projecting point forming the western side of Stobrez Cove and is visible at some distance; the cove is a small indentation into which the Xernovica River empties itself; small vessels anchor on its eastern side, but the northwestern side is shallow. The bora blows severely here.

The coast between Stobrez Cove and Almissa Road, 8 miles southeastward, is accessible throughout. The country for about 1 mile inland is richly cultivated, with numerous dwellings here and there. Oil, wine, and maraschino are the products. The land rises abruptly at the margin of this cultivated ground to rocky mountains of whitish aspect, from 1,450 to 1,950 feet high, which afford protection from northerly winds to the vegetation below.

Anchorage in good holding ground may be obtained during a bora all along this shore at a short distance from it, but not near any of the salient points.

A telegraph cable is laid from Monte Grosso Point, $2\frac{1}{4}$ miles southeastward of Stobrez Cove, to Vela Luka Cove, in Brazza Island.

Lunga Point, 6 miles southeast of Stobrez Cove, projects and is bordered by shallow water, the southwestern edge of which is marked by a group of wooden stakes in 9 feet water, surmounted by an iron staff with two white, openwork circular disks, placed vertically, 11 feet above high water.

Almissa Road (lat. 43° 26' N., long. 16° 41' E.).—Between Lunga Point and Malaluka Cove, 3½ miles to the southeast, the shore recedes nearly 1 mile, and in the bight is Almissa Road. There is anchorage in a depth of about 14 fathoms, mud, off the monastery of San Francesco, which stands near the shore about ¼ mile southeastward of the town; vessels of light draft moor near the shore, to which they secure against the bora, which wind, however, does not blow so violently here as on other parts of the coast.

The northwestern shore of the road is bordered by a bank, steep-to but extending 3 to 4 cables from the shore; this bank is the deposit from the Cetina River, has from 3 to 6 feet water on its edge, and from 6 to 12 fathoms close-to.

The town of Almissa—ancient Onœum—is on the eastern bank, at the entrance of the Cetina River, and at the foot of a mountain on the summit of which at 1,020 feet above the sea stands the old castle of Mirabella. Almissa was formerly a considerable and fortified place, but was destroyed by the Venetians owing to the piratical habits of its inhabitants; it is now almost deserted, being rendered very insalubrious by the neighboring marshes.

Mount Kosik, of the Mossor Range, rises 4,324 feet above the sea about 2¼ miles northward of Almissa. Mount Borak, 2,635 feet high, 2 miles southeastward of Almissa and about a mile from the sea, marks the position of the town and anchorage; its peaked summit of naked rock commands an extensive view of the surrounding country.

Lights.—(See Light List.)

Mooring buoy.—A mooring buoy is located 180 yards from the shore off Rad (Ralmali) Village, about 1,800 yards southward of San Francesco Convent.

Cetina River (ancient Nestus) is one of the chief rivers of Dalmatia; its source is at the base of mounts Dinara and Ghgnat on the Bosnian frontier, from whence it flows through Sign and Trigl, near Duare Castle, where is the finest of its many cascades, and from thence through Vissech to the sea at Almissa. It is navigable by boats drawing about 3 feet as far as the mills of Vissech; the passage over the bar, on which there is little more than 3 feet, requires local knowledge.

Telegraph.—There is a telegraph cable laid between Velika Luka, situated a short distance southeastward of Malaluka Cove, and a small cove just west of the lighthouse at Pucisce on the opposite shore.

The coast from the base of Mount Borak trends east-southeastward $7\frac{1}{2}$ miles to Vrullja Cove, and then southeastward $8\frac{1}{2}$ miles to Port Makarska. It is backed close inland by high rocky mountains. At Vrullja is a sudden depression, southward of which the mountains rise to a still greater height than before, and this is maintained for 23 miles southeastward of Makarska as far as the mouths of the Narenta River. The low grounds between the mountains and the sea are generally cultivated and contain several villages, of which Rogosnica (lat. $43^{\circ} 25' N.$, long. $16^{\circ} 46' E.$) on an eminence 2 miles southeastward of Mount Borak is the most conspicuous, being visible from a considerable distance along the seashore on either side of it.

There is no safe anchorage between Mount Borak and Vrullja. Vrullja Cove itself is difficult of approach by sailing craft, owing to strong eddies caused by subaqueous springs; the depth near it is considerable, being 39 fathoms at the entrance and 22 fathoms close to the shore. The bora, when blowing, rushes with violence through the valley. The land in the vicinity has a barren, desolate appearance.

Between Vrullja Cove and the town of Makarska the coast has the same appearance. Coasters anchor for shelter from the bora, securing with cables to the shore, in Cerkalije Cove, a small bend in the coast at Brela Village; also at Soline and Baskavoda Coves close to the shore, to which their cables are secured.

Water may be obtained at Baskavoda from springs.

Port Makarska.—This little port (lat. $43^{\circ} 17' N.$, long. $17^{\circ} 01' E.$, var. $7^{\circ} 30' W.$), with depths of 4 to 6 fathoms, muddy bottom, is used by vessels of moderate size; coasters anchor at the head and make fast to piles on the beach. It is sheltered southwestward by a rocky point, on the summit of which is the chapel of San Pietro, but is visited by heavy bora squalls from the high land in its rear.

The small town—ancient Albius—which is close to the water and rather picturesque, communicates with Spalato, 30 miles distant, by a road which passes Almissa, and follows, generally, the trend of the coast; the town carries on a small trade with the interior.

Water and fresh provisions may be procured, and there are facilities for repairing small craft.

Lights.—On the northwestern point of San Pietro Peninsula is a stone-colored tower over the center of a dwelling, 46 feet high, from which is exhibited at an elevation of 51 feet above the sea, a fixed white light, visible 13 miles, when bearing between 321° and 141° .

A fixed red light, elevated 20 feet above the sea, visible 2 miles, is shown 16 yards from the molehead within Makarska Port. The light may be seen from the northwestward over the low neck of land forming the peninsula of San Pietro. It can not be depended upon during the bora.

There is a mooring buoy in Port Makarska.

Mount Biokovo, 5,780 feet above the sea, is the highest and most remarkable of the mountains in the neighborhood of Makarska, and, like the others, the upper portion is whitish and destitute of vegetation. When it is enveloped in fog, which rises in a scattered form, a strong northerly wind may be expected.

Brazza Island (lat. 43° 20' N., long. 16° 24' E.), separated from Solta Island by Spalato Passage, is one of the richest and most populous of the Dalmatian Islands; it is 22 miles in length, in an east and west direction, 7 miles across its broadest part, and, at its western end, nearly 5 miles. The southern side is highest and very mountainous; near the middle, on that side, Mount San Vito rises, 2,552 feet above the sea; the slope towards the northern shore is gradual. The hills are well wooded and afford good pasturage; the lower grounds are cultivated and produce wheat, wood, oil, wine, and firewood.

It contains 19 villages and about 16,000 inhabitants, who are very industrious and make good sailors. Bol, the chief village, is close to the sea near the middle of the southern coast.

Cape Planche, the eastern extreme of the island, is low and woody, and is about 3 miles from the mainland.

Telegraph cables.—Telegraph cables are laid from Vela Luka Cove on the northern coast of Brazza Island to Monte Grosso Point; from a small cove just west of Pucisce Lighthouse to Velika Luka Cove, both on the mainland; and from Bol on the southern coast to Chiave, the bay next eastward of Stinja Cove, Lesina Island; the shore end at Bol is marked by a tower near the southeastern extreme of the sea wall. Vessels should avoid anchoring near it. The western end of Brazza is also united with Solta by cable.

West coast.—**Port Stipanska**, a small creek under San Giorgio Point, the northwestern extremity of Brazza, is the northernmost of the anchorages on this coast which afford good shelter from the bora; the depth is 11 fathoms, mud, but the space is sufficient for two or three vessels only. Vessels of any size may safely anchor in northeasterly winds outside the creek southwestward of the point at the left of its entrance.

Bobovisce Cove, 1½ miles southward of Port Stipanska and beyond a bluff, steep, rocky point covered with wood, affords shelter at its entrance; in a Bora vessels of light draft anchor inside and make fast to the shore near the village. This anchorage, as well as that of Stipanska, is difficult to reach with easterly winds and both are exposed to westerly winds.

Port Milna (lat. 43° 20' N., long. 16° 25' E.), the best of the Brazza ports, is protected from all but northerly and northwesterly winds; it is considered an excellent anchorage, with room for several vessels. The outer anchorage is between Zaglav Point and the en-

trance, in a depth of 14 to 19 fathoms. Small vessels anchor in the middle of the inlet, which is about $\frac{3}{4}$ mile deep and at its head is the village.

Small supplies may be procured at the village and slight repairs made.

Lights.—On Biaka Point, the northern entrance point to Port Milna, stands a stone turret 25 feet high from which, at an elevation of 26 feet above the sea, is exhibited a group flashing light, visible 5 miles.

A light, visible 2 miles, is exhibited at the entrance of the inner harbor of Milna. See Light List.

North coast.—**San Giovanni village** is 2 miles from the north-western end of Brazza; there is no port, but about $\frac{1}{2}$ mile from the shore anchorage may be obtained in a depth of 17 and 18 fathoms.

Light.—From a post on the southwest angle of the molehead, at an elevation of 18 feet above the sea, a fixed red light is exhibited, visible 3 miles, between 146° and 254° .

Vela Luka Cove—Telegraph.—At Vela Luka Cove, $\frac{3}{4}$ mile westward of San Pietro, there is a telegraph station and a cable is laid thence to Monte Grosso Point on the mainland.

Port San Pietro, about $5\frac{1}{4}$ miles to the eastward from the north-western extremity of Brazza, is the chief of the small ports or coves on the northern coast of Brazza and is protected by a mole. Its position is denoted by a small church on the western point of the port and by the village which is on an eminence. Off-shore $\frac{1}{2}$ mile and fronting the port there is a patch with 3 fathoms water.

Light.—From a stone turret on the molehead, at an elevation of 24 feet above the sea a fixed green light is exhibited, visible 3 miles.

Port Postire, $3\frac{1}{2}$ miles eastward of San Pietro, is quite exposed and unimportant.

Light.—From a small masonry tower on the molehead, at an elevation of 23 feet above the sea, is exhibited a fixed red light, visible 3 miles.

Port Pucisce, $8\frac{1}{2}$ miles eastward of San Pietro, is a narrow inlet running in about 1,400 yards, with a depth of 17 fathoms at the entrance, decreasing to 3 fathoms off the village at its head.

Light.—At 45 yards within San Nicolo Point, the western point of entrance to Port Pucisce, at an elevation of 66 feet above the sea, a fixed white light is exhibited, visible 5 miles.

Luka and Povie Coves (lat. $43^{\circ} 20' N.$, long. $16^{\circ} 49' E.$), 4 miles east of Pucisce and the same distance from the eastern extremity of the island, are situated in the same bay. The western arm, in which Luka is situated, is about 1 mile in length, with deep water in the entrance shoaling to 8 and 9 fathoms near its head; being open to the eastward, it is exposed to winds from that quarter.

Povie Cove, in the southeast part of the bay, has depths of 9 to 12 fathoms, extending southeastward to Povie village. There is anchorage for small vessels, well sheltered from the eastward.

There are many other small coves along the northern coast of Brazza, frequented by boats trading with the mainland.

Light.—From a white stone tower, 16 yards within San Antonio Point, the northeastern point of Povie Cove, at an elevation of 24 feet above the sea, a fixed red light is exhibited, visible 3 miles.

South coast of Brazza.—**Port San Martino**, at the southeastern end of Brazza, affords protection for small vessels from the bora in a depth of about 7 fathoms, mud, on the western side of San Martino Point, the headland which forms the port. Vessels of light draft anchor farther in. The woods on this part of the island are considered to break to a great degree the force of the Bora. San Rocco Point, on which is a church, sufficiently indicates the position of the port; it is 2 miles southward of Cape Planche, the eastern extremity of the island, and about $\frac{1}{2}$ mile northeastward of the entrance to Port San Martino.

Telegraph.—There is a telegraph station at Port San Martino.

Lights.—On San Martino Point, from a stone tower on the southeastern side of the keeper's dwelling, 13 yards from the shore and elevated 24 feet above the sea, is exhibited a fixed white light, visible 5 miles.

On the head of the mole in Port San Martino, a fixed red light is exhibited at an elevation of 18 feet above the sea, visible 2 miles. Not lighted in strong southeast winds.

Bol.—This village is about in the middle of the southern coast of Brazza and is the center of the trade of the whole island, being rich and populous and extending about 1,400 yards along the shore. Near the center of it is a cove and mole, under which small craft find shelter. Vessels of larger size anchor outside opposite the cove in depths of 9 to 11 fathoms, sand, abreast of San Nicolo Church, which stands on a hill at the eastern extremity of the village; care should be taken to avoid the telegraph cable.

In approaching the anchorage from the westward, a berth should be given to Lunga Point, about a mile westward of the village, from which, as well as from the shore eastward of it, a reef projects some distance.

Mount San Vito, 2,552 feet above the sea, the highest point of the island, is a good distant mark for the anchorage, Bol lying at its foot about 2 miles eastward of its summit.

Water and small supplies of provisions may be procured at Bol.

Light.—From a white stone turret at the head of the mole at Bol, elevated 24 feet above the sea, is exhibited a fixed red light, visible 8 miles.

Ports Giuseppe, Lucice, Gerska, and Oliveto, near the western extremity, are the only other anchorages worthy of mention on the southern coast of Brazza; these are available for small craft only, which frequently await in one of the first two a favorable opportunity for passing through the Spalato Passage. In these small ports vessels generally secured to the shore after anchoring.

Brazza Channel, a continuation of the Spalato Channel, is the passage between Brazza Island and the mainland; it is exposed to sudden and violent bora gales. The current is regular, but frequently rapid when the Narenta and Cetina Rivers are swollen. Near mid-channel the depth is from 30 to 42 fathoms, and the bottom is almost everywhere mud; along the shore of Brazza, and occasionally near the mainland, it is a mixture of mud and sand.

Two rocky shoals, already mentioned, lie in the channel, viz, the $4\frac{1}{2}$ and 5 fathom patches between Stobrez Cove and Spalato, and the 3-fathom shoal off Port San Pietro, Brazza Island. Coasting vessels keep close to the Dalmatian shore and avoid navigating the channel at night.

The coast of the mainland between Makarska and the mouths of the Narenta River, a distance of about 23 miles, is backed by high land presenting a few bare peaks; Mount Susvid, 3,790 feet high and nearly north of the eastern extremity of Lesina Island, is the highest and most remarkable of these peaks and is of conical form. A few scattered villages may be seen within the coast, and the land appears fertile and well cultivated, but there is no port or good anchorage on this part.

Small craft occasionally anchor in a depth of about 9 fathoms 200 yards from the shore for shelter from a bora, and when meeting contrary winds between the eastern part of Lesina Island and the mainland resort to Dervenik Cove, 3 miles northeast of San Giorgio Point, the eastern extremity of Lesina, or to Zaoztrog Bay, $2\frac{1}{4}$ miles east of Dervenik Cove. Zaoztrog Bay may be known by a small chapel on the eastern point of entrance and by some houses at its head; the holding ground is good. Zaoztrog Bay is also marked by a convent on its northern shore. The small vessels frequenting these bays anchor in the middle and lay out a cable to the shore, besides taking extra security seaward against southerly winds. There is a small mole in the bay.

Podgora Cove—Buoy.—There is a buoy, in 17 fathoms water, about 75 yards off the molehead in Podgora Cove, near Luka village, $3\frac{1}{4}$ miles southeastward of Makarska.

Narenta Channel is the eastern continuation of the Curzola Channel, and is bounded by the eastern part of Lesina Island and the coast of Dalmatia on the north side, and by the Sabbioncello Pe-

ninsula on the south; it is clear of dangers, with deep water varying from 32 fathoms in mid-channel in its outer part to 14 or 15 fathoms off the entrance of the Narenta River.

It is advisable when proceeding up this channel, especially with northerly and easterly winds, to keep near the shores of Lesina and the mainland, where a favorable counter current will generally be met, as the Sabbioncello coast is without places of shelter. The waters of the Narenta flow into the eastern part of the channel and cause a rapid westerly current, especially in the rainy season, at which period the water is frequently discolored as far as the entrance of the channel.

Sabbioncello Peninsula, north coast.—Cape Gomena, the northwestern extreme of the Sabbioncello Peninsula, juts out westward between the islands of Lesina and Curzola, which, here, are about $8\frac{1}{2}$ miles apart; it is lower and less steep than the rest of the coast, but the land $3\frac{1}{2}$ miles southeastward of it rises to a height of 1,315 feet, and 2 miles farther eastward is Mount Velika Dolina, 2,474 feet above the sea. The northern side of the cape is bordered by a rocky bank extending more than $\frac{1}{2}$ mile off-shore.

From Gomena Point eastward, the whole northern shore of the Sabbioncello Peninsula forming the southern side of the Narenta Channel, is high, wooded, and, with two exceptions, steep-to and affords no shelter. Duba Point, on which there is a chapel, $7\frac{1}{2}$ miles eastward of Cape Gomena, is bordered by a shoal. Nearly 4 miles further eastward, about $\frac{1}{2}$ mile westward of Trappano, is another shoal with 2 fathoms water, about $\frac{1}{2}$ mile from the shore, and with a depth of 12 fathoms inside it. There are several small coves completely exposed to northeasterly winds, and a few villages, of which the chief, Trappano (where there is a small mole) and Duba, are easily recognized by their church steeples; the inhabitants carry on a small trade in cured fish.

Telegraph cable.—A telegraph cable connects Cape Gomena with Smerska Cove, on the southern side of Lesina Island.

Lights—Cape Gomena.—At 23 feet from the extremity of Cape Gomena, from a red masonry tower 34 feet in height, a fixed white light, visible 9 miles, is exhibited at an elevation of 37 feet above the sea. The light is visible between 357° and 258° . Not lighted in stormy weather.

Trappano (lat. $43^{\circ} 01' N.$, long. $17^{\circ} 16' E.$).—About $\frac{1}{2}$ mile westward of Trappano Church is the little port of that name, protected by a small mole or breakwater. From a post on the molehead, at an elevation of 24 feet above the sea, a fixed white light with red sector is exhibited. Not lighted in stormy weather. (See Light List.)

Cerkvice Cove Light.—A light is exhibited from a lamp-post, 17 feet high, on the head of the mole at Cerkvice Cove, $5\frac{1}{2}$ miles south-eastward of Port Trappano.

Sreser Shoal—Beacon.—A stone obelisk, 16 feet high and painted red and white in horizontal stripes, stands in $1\frac{1}{2}$ fathoms water on Sreser Shoal, which is situated nearly $\frac{1}{2}$ mile south-southwestward of Gojak Islet.

Briesta Bay, opposite the entrance to Klek Bay, is an indentation $3\frac{1}{2}$ miles in length and about 1 mile in depth, encumbered with islets, rocks, and shoals, but with deep water between and among them. The little islet of Gojak lies 71° $\frac{1}{2}$ mile from Rat Point, the north-western extremity of the bay, and there is a smaller islet between it and the shore. Blaca Point, the southeastern point, projects north-westward, covering and sheltering from the eastward an anchorage with a depth of from 10 to 12 fathoms; in the extreme corner of the bight thus formed is the village and church of Briesta. All the islets and rocks of the bay are within a line drawn from Blaca Point to Gojak (Goljak) Islet.

Lights.—On **Blaca Point**, from a white stone turret adjoining a dwelling 43 feet high, at an elevation of 55 feet above the sea, a fixed white light is exhibited, visible 10 miles when bearing between 127° (leading 400 yards clear of Gojak Islet) and 285° .

Drace.—From the molehead of Drace, at the western end of Briesta Bay, a light is exhibited. Can not be depended upon in stormy weather. (See Light List.)

From Blaca Point southeastward, the remainder of the northern coast of Sabbioncello is included in the description of the Stagno Piccolo Channel.

Northern shore.—**Gradac** is a small village and fort on the mainland abreast San Giorgio Point, the east extreme of Lesina Island and $3\frac{1}{2}$ miles southeastward of Zastrog Bay; there is a mole in the bay affording shelter where coasting craft unload.

Light.—From an iron standard on the molehead of Gradac, at an elevation of 15 feet above the sea, a fixed green light is exhibited, visible 3 miles, between 161° and 50° .

Porto Tolero (lat. $43^{\circ} 02' N.$, long. $17^{\circ} 25' E.$).—The western side of the entrance to this small port is the high bluff point of Visnica, the termination of the bold coast on the north; the eastern side of entrance is the low broken shore forming part of the delta of the Narenta, the shallow water from which, reaching almost over to the high land of Visnica, is marked by piles and leaves only a narrow passage into the port.

The passage is about 1,200 yards in length, passing eastward of a large rock a little within the entrance and then close along by the western shore, the least water being 2 fathoms. Within is a land-

locked basin nearly $\frac{3}{4}$ mile north and south and 700 yards wide, with depths of 6 to 8 fathoms, protected from the southward by the delta of the Narenta, which extends from this to the rocky islet of Ossin $2\frac{1}{4}$ miles southeastward.

Narenta River, one of the largest of Dalmatia, rises at the base of the mountains between Bosnia and Herzegovina, and, after receiving the waters of numerous tributaries, enters Dalmatia at the village of Metkovic, 11 miles above the entrance. From thence it traverses a marshy country and discharges itself into the sea between long embankments and moles, nearly 2 miles southeastward of Port Tolero and 1 mile northwestward of Ossin Islet.

Depths.—Extensive works have been carried out in order to confine the course of the Narenta through the marshy plain between Metkovic and the sea to one channel about 11 miles in length.

Vessels which can cross the bar (13 feet) can ascend the river as far as Metkovic, 11 miles above the entrance, which place is in railroad communication with Mostar, the capital of the Province of Herzegovina. Small vessels can proceed as far as the village of Vido near the ruins of the ancient town of Narenta.

Quays are established at Opus, about 6 miles from the entrance, and again at Norino, 2 miles higher, where the river is crossed by a ferry chain and also by a telegraph cable, the position of which is sufficiently guarded by the ferry.

Narenta was formerly the capital of Dalmatia and of great influence, exacting tribute from the whole of Dalmatia and from Venice for the right to enter the channel; it was afterwards governed by independent sovereigns and formed a separate duchy. The neighborhood now is but thinly populated, owing to its insalubrity so far as the lowlands are concerned, but the great improvements in the river have given an impetus to trade.

Beacons.—North of the entrance to the river, at 600 yards northwestward of the northern molehead, there is a group of red stakes with a triangular topmark which marks the edge of the shore bank.

On the southern side of the entrance to the river there are two conical buoys and one can buoy painted white, all with top marks, marking the north side of the bank extending seaward from the southern mole; the southwest or outer edge of this bank is marked by three white stakes with pyramid-shaped topmarks. This bank is subject to change.

On the northern summit of Galicak hill there is a conspicuous stone cross.

Moles—Depths in river.—The moleheads are distinguished by day as follows: On the South Molehead is a shed surmounted by a cone, point downwards, the whole painted green. On the North

Molehead is a shed surmounted by a skeleton ball, the whole painted red. The depth of water in the entrance, in meters, is shown to vessels about to enter in white figures on a blackboard raised 9 feet above the South Molehead. Near the inner light structure on the same mole, the depths of water over the banks in the river are shown from a similar board.

Lights.—On the North Molehead, at the entrance to the Narenta River, a fixed red light is exhibited, elevated 13 feet above the sea, and visible 2 miles.

On the South Mole, 400 yards from the end, a fixed red light is shown, at an elevation of 26 feet above the sea, visible 4 miles.

On the head of this mole, elevated 13 feet above the sea, a light is exhibited, visible 1 mile, showing red when bearing from 102° to 114°. (See Light List.)

Directions.—The entrance fairway is just northward of the white buoys and beacons marking the bank on the south side of the channel. The depth is 2 fathoms but is subject to change. It is not prudent to attempt to enter without local assistance. Depth signals are shown from South Molehead.

Outer anchorage.—Between the entrance to the Narenta and Ossin Islet to the southward, is Narenta Anchorage with depths of 7 to 10 fathoms, mud. On the southeastern side of Ossin Islet there is a small sheltered area with 3 and 4 fathoms water, named Blaca Bay; the anchorage here is on the western side of the bay, the whole of the center being occupied by a 6-foot shoal connected with the Planik Islets and with the shore on the southeastern side.

Up-river lights.—At Opus Fort, about 6 miles up the river, a small fixed red light is exhibited from the east corner of the quay, visible 1 mile.

A fixed white and red light, visible 1 mile, is shown at Port Metkovic farther up the river.

Coal.—From Metkovic, about 11 miles up the Narenta River, between 30,000 and 40,000 tons of coal is annually exported from the Austrian Government mines. About 100 to 150 tons is usually in stock.

The light on Blaca Point, on the Sabbioncello Peninsula, is a great assistance at night in approaching the Narenta.

The coast between the mouth of the Narenta and the entrance to Klek Bay, about 6½ miles southeast of it, is steep and rocky, backed by high mountainous land, and presents nothing more remarkable than a church and dwellings here and there. Besides Blaca Bay, the two little bays of Duba and Soline afford shelter and there is anchorage all along the shore in this part at 1,000 to 1,600 yards from it.

Klek Bay is an inlet $3\frac{1}{2}$ miles in length and about $\frac{1}{2}$ mile in breadth, formed by a high narrow peninsula which follows the direction of the coast northwestward and terminates in Klek Point.

The entrance, about 800 yards in width, with a depth of 13 fathoms, is immediately opposite Blaca Point Lighthouse $1\frac{1}{2}$ miles distant on the opposite shore of the channel, and is open to the westward. Klek Point, the southern point, is bordered by shallow water while the northern point is steep-to.

Within the entrance is a small bay on each side and then two points again approach each other from the opposite shores forming an inner entrance. Off the northern inner point lies the Montecuccoli Rock, above water and connected with the shore by a flat; and, off the southern inner point is a similar rock and flat.

Directions.—There are no hidden dangers within the bay, which has a depth of 10 to 14 fathoms and is an excellent port for vessels of the deepest draft, but is unfortunately so inconveniently isolated.

No fresh water is obtainable and its well wooded shores are nearly uninhabited. The nearest watering place is Briesta, on the opposite shore of Sabbioncello.

Lights.—From a tower on the side of a small stone house on Montecuccoli Rock, at an elevation of 30 feet above the sea, is exhibited a group flashing red light, visible 5 miles.

From the south angle of landing place at Port Neum, 3 miles within the entrance of Klek Bay, a fixed white light with red sector is exhibited at an elevation of 18 feet above the sea, visible 2 miles. (See Light List.)

Telegraph.—Neum is a telegraph and postal station.

Stagno Piccolo Channel is the continuation southeastward of the Narenta Channel and, commencing at the entrance to Klek Bay, ends $10\frac{1}{2}$ miles farther southeastward in a blind channel. For the first 5 miles it is deep and clear of dangers, with muddy bottom, and vessels of deep draft may anchor safely in any part; but the narrowness of the channel and the frequency of violent gales render its navigation difficult for sailing vessels.

At $5\frac{1}{2}$ miles from Klek Point, Nedilja Point, the extreme north-western point of a tongue of land jutting out from the Sabbioncello shore, narrows the channel to about 600 yards, and from thence it can only be navigated by small vessels. Here Bjelevica Bay on the southern side and Bistrina Bay on the northern shore, afford shelter; the former in depths of 6 to 8 fathoms, the latter in 3 to 5 fathoms.

Beyond the entrance to Bistrina Bay the channel becomes very narrow and is almost barred by a rocky shoal, though it again opens out somewhat, before finally terminating some $2\frac{1}{2}$ miles beyond this point.

Stagno Piccolo—Lights.—Lights are shown from an iron post, 25 feet high, on Celjen Point, on the southern side of the channel $1\frac{1}{2}$ miles within Nedilja Point; from an iron post 22 feet high on Mirna Point, on the eastern side of Hodilje boat harbor; from a conical masonry beacon 13 feet high on Vranjak Shoal; and from an iron post 16 feet high on Mali Vos Point, on the northeastern side of the channel opposite Stagno Piccolo.

The town of Stagno Piccolo (lat. $42^{\circ} 51' N.$, long. $17^{\circ} 42' E.$), almost in ruins, is on the southwestern shore about 2 miles from the southeastern extremity of the channel; it is visited only by vessels of less than 12 feet draft, on account of the rocky shoal just mentioned, and known as the Vranjak Shoal, on which is a stone conical beacon standing in about a foot of water, with a depth of 11 feet in the channel between it and the northern shore and $12\frac{1}{2}$ feet in that between it and the village of Hodilje on the southern side.

The southern channel is marked by four conical buoys, painted white.

Stagno Piccolo is only 1,400 yards distant by land from Stagno, but when approached by the Great Stagno Channel on the opposite side of the Sabbioncello Peninsula the distance between the two places by water is about 87 miles.

The shores of the Stagno Piccolo Channel are generally high and wooded, and the creeks and inlets abound with trunks of trees from which the natives gather quantities of oysters.

Lesina, the ancient Pharos, is one of the largest and most populous of the islands of Dalmatia, from which coast its eastern end is distant only $2\frac{1}{4}$ miles. The island is $37\frac{1}{2}$ miles in length in a W. by N. and E. by S. direction; its width for 22 miles from the eastern end averages about 2 miles; the island then widens to 5 miles, the northern coast trending northward, and from thence this coast is much broken by bays and inlets and is very irregular as far as the western end. Nearly the whole of the southern side rises abruptly, a chain of mountains at a short distance from the sea extending from the western end more than two-thirds of its length. The highest of these, Mount San Nicolo, is about 11 miles from the western end and is 2,053 feet high; on its summit is a chapel.

From Mount San Giorgio, 1,184 feet high and 11 miles from the eastern end, the heights decline gradually in that direction. The higher portions of the island present the bare and sterile appearance common in these parts; the lands sloping toward the north are well cultivated and abound in wood and pasture ground.

There are numerous villages besides the town of Lesina, and in all about 18,000 inhabitants, who are considered good sailors and expert fishermen and carry on a considerable trade in salt fish and sardines,

which latter are plentiful on this coast; these, together with wine of good quality, oil, wheat, honey, of which latter a great deal is exported, and firewood form the chief products. The island has several good anchorages in bora gales.

Telegraph cables.—A telegraph cable extends from Chiave Bay, the next bay eastward of Stinja Cove, to Bol in Brazza Island; another from the little inlet between Great and Little Palermo, near the western end and on the southern coast of Lesina, passes between Parzanj and Lingua, near the western end of the Spalmadori Islets, and thence to Smokova Cove at the northeastern end of Lissa. Turicina Bay, near the eastern end of Lesina, is connected by cable with Igrane, opposite on the mainland northward of it; and Smerska Cove, on the southern coast, is connected with Cape Gomena, Sabbioncello.

Greco de Lesina Channel is the passage between Lesina and Brazza Islands, and has a varying breadth of about 2 to 6½ miles. There are no hidden dangers except the shoal projecting about 300 yards from Lunga Point, Brazza Island; the depth in mid-channel is from 40 to 44 fathoms; the bottom is sand and mud.

This channel is seldom used except by vessels bound to Makarska on the mainland. The shore of Brazza should be kept aboard in a sailing vessel so as to be enabled to bear up for Citta Vecchia Bay, or for the Lesina Channel if overtaken by a bora; shelter from this wind may also be obtained in the channel under Brazza, off Vol village.

The current generally sets westward and is influenced at the most contracted part of the channel by northwesterly and by southeasterly winds; also by the waters of the Narenta.

Northern shore of Lesina.—Cape Pellegrino, the western extremity of Lesina, is the termination of the mount of that name, which is ¾ mile within the cape and 492 feet high. From the cape, which is steep-to, the northern coast trends eastward 10 miles to the town of Citta Vecchia; it is throughout bold, broken, and cut up into numerous little coves, the land immediately over it rising 1,130 feet above the sea.

Citta Vecchia Bay is the deep inlet between the eastern part of the land just described and a fertile peninsula with an irregular and bold coast projecting from the northern side of the island and terminating 7 miles eastward of Cape Pellegrino in Kabal Point, which is well wooded and 423 feet high. The bay recedes 4 miles and averages about 1 mile in width, is open to the northwest, but is well sheltered from northerly winds by a deep indentation on its northern shore. The bottom is mud and sand.

The town of Citta Vecchia is on the southern shore of a narrow inlet, $\frac{1}{2}$ mile in length, at the head of the bay; it has 3,100 inhabitants and is the most populous on the island and carries on a great part of the martime commerce of Lesina. Coasting vessels are built here. Water and provisions may be procured.

The best anchorage for small vessels during the bora season is in Port Tiha, the first or outer indentation on the northern side of the bay, as there is shelter from northerly winds. The anchorage in Citta Vecchia Bay has depths of 14 fathoms about $\frac{3}{4}$ mile westward of the town. Coasters moor in the inlet a little below the town.

Light.—From an iron cylindrical tower on Fortino Point, the southern point of entrance to the shallow harbor of Citta Vecchia, at an elevation of 28 feet above the sea, is exhibited an occulting light with red sector. (See Light List.)

A green light is shown from an iron post 17 feet high at the western end of the quay at Citta Vecchia.

Buoy.—A white buoy is moored in $1\frac{1}{2}$ fathoms water on the northern edge of a shoal close westward of the quay.

Telegraph.—There is a telegraph station at Citta Vecchia.

Ports Verboska and Gelsa.—Immediately eastward of Kabal Point, the northwestern extremity of Citta Vecchia Bay, is Port Vlaska, an indentation $\frac{1}{4}$ mile deep, the eastern point of which is foul; the coast is then irregular, broken, and deeply indented with many small coves and inlets for 8 miles farther eastward to Port Verboska, which, with Port Gelsa, lies within the bay formed between Glavica Point on the north and San Antonio Point on the south.

Port Verboska is protected from northerly winds by a peninsula 85 feet high, on the northern side, projecting eastward, of which the extremity is Glavica Point. Vessels anchor in a depth of about 12 fathoms, mud, a short $\frac{1}{2}$ mile westward of Glavica Point, within the bend of the shore. Small vessels proceed farther in and secure from bora gales by laying out cables to the northeastern shore. At the head of the narrow inlet, which takes a northwesterly direction upward of 1 mile from Glavica Point, is the village of Verboska.

On the northern side of Glavica Point is the islet of Zecevo, 92 feet high; San Antonio Point is bluff, precipitous, and covered with trees.

Port Verboska—Lights.—Lights are shown from a red iron post 14 feet high on Croce Point about $\frac{1}{2}$ mile westward of Glavica Point; and from a lamp-post 15 feet high on the eastern end of the quay at Verboska.

Port Gelsa is an inlet about 800 yards deep, open to the northeastward, the entrance being a little over $\frac{1}{2}$ mile southward of Glavica Point. At the head of the port is the village of the same name and

here the inlet turns westward and is protected by two moles, one projecting from the northern, the other from the southern shore, and within them are depths of from 2 to $3\frac{1}{2}$ fathoms. Small vessels also anchor in about 6 fathoms in the middle of the inlet, but outside the moles. Water may be obtained in abundance at this village.

Telegraph.—There are telegraph stations at Verboska and Gelsa.

Lights.—On the northern molehead at Gelsa is a small octagonal white tower, from which is exhibited, at an elevation of 24 feet above the sea, a fixed red light, visible 3 miles. During a bora it is not possible to exhibit the light.

A light is exhibited from an iron post 19 feet high at the southeastern corner of the quay jetty. (See Light List.)

Coast.—From Port Gelsa, the shore trends nearly in a straight line about 22 miles to the eastern extreme of the island. There is no port or place of shelter in all this distance, with the exception of little coves here and there, and the water is deep close inshore the whole of the distance. There is, however, a shoal with $4\frac{1}{2}$ fathoms water which should be avoided, about 1,600 yards northward of the western point of Pogarila Vela Cove and $7\frac{1}{2}$ miles westward of San Giorgio Point.

South coast of Lesina—San Giorgio Point, the eastern extremity of Lesina, is low, with a chapel on it; it is steep-to on its northern and eastern sides, but there is a depth of 2 fathoms near its southern side.

Port San Giorgio, about 800 yards westward of San Giorgio Point and on the southern side of the island, is formed by a small mole which affords shelter to coasting vessels; near it, on the beach, is a tower. This is the principal and may be said to be the only anchorage toward the eastern end on the southern side of Lesina; but vessels of any draft may take temporary shelter from a bora under any part of the shore from Port Martinisko, about 4 miles westward of San Giorgio Point to abreast of Cape Gomena, the western extreme of the Sabbioncello Peninsula. Vessels should not anchor in a greater depth than 18 fathoms, weeds, nor at much more than 400 yards from the shore.

Lights.—An occulting light is exhibited from a stone tower, situated about 45 yards northward of the chapel on San Giorgio Point, at an elevation of 48 feet above the sea, visible 9 miles, when bearing between 130° and 75° . The keeper's dwelling stands near the lighthouse. (See Light List.)

From an iron standard on stone base on the molehead of Port St. Giorgio, elevated 15 feet above the sea, a fixed white light is exhibited, visible 3 miles.

The south coast of Lesina is fairly steep-to and affords no anchorage except for very small craft in the several coves, which require local knowledge to be available.

The depths are from 6 to 12 fathoms fairly close to the shore, which is backed by high land.

Torcola Island lies $1\frac{1}{4}$ miles from about the middle of the southern shore of Lesina; it is $3\frac{1}{2}$ miles in length, 1 mile in extreme breadth, from 262 feet high at its eastern end to 370 feet at the western end, and covered with bushes. The shores are in general steep-to, except at the eastern end, which is bordered by a narrow bank and a $2\frac{1}{2}$ -fathom shoal lies off the eastern point of Oliveto Cove at the northwestern part of the island; a 5-fathom patch also lies $\frac{1}{2}$ mile farther westward. There is no anchorage on the southern side; it is inhabited by a few shepherds during the grazing season.

Porto Grande, near the middle of the northern side of the island, has a depth of 5 fathoms at its head, where small vessels find shelter in two creeks. The two entrance points of this post are of whitish color.

Lights.—On the east side of the entrance to Porto Grande, a white light with green sector is exhibited from an iron standard 20 yards within the shore, at an elevation of 21 feet above the sea, visible 2 miles.

Torcola Island.—A light is exhibited, at 66 feet above high water, from a circular red hut with a gallery, 32 feet high, situated on the coast of Torcola Island, 500 yards southeastward of Maestro Point, the southwest extremity of the island; a sector is shown over the Lukavei Rocks. (See Light List.)

Torcola Channel, the passage between Lesina and Torcola Island, is 1.3 miles wide, is quite safe, being deep, and, with the exception of the shoal close off the point of Oliveto Cove, is clear of danger. It is difficult and often impossible to work through from the westward, easterly winds greatly accelerating the westerly current, but coasters frequently use this channel in order to keep to windward in the event of a bora.

Lukavei (Bacili) Islets.—About $2\frac{3}{4}$ miles from the coast of Lesina and rather more than 3 miles westward of Torcola Island are the two small Bacili Islets 19 feet high and surrounded by shallow water which extend east and west over a space of about $1\frac{1}{4}$ miles. A rocky $4\frac{1}{2}$ -fathom patch lies 700 yards northwest of the western islet with a depth of 9 fathoms between. The flat on which the islets are situated extends 700 yards northeastward of the southeastern islet, with 2 fathoms water, and the whole is steep-to.

During easterly winds the current sets strongly in the vicinity of these islets.

Port Lesina, on the southwest side of Lesina, is situated about $3\frac{1}{2}$ miles southeast from Cape Pellegrino, is the only port of any consequence on the southern side of the island. It is open to the southward, but somewhat sheltered in that direction by the small islet of

Galisnik, 59 feet high and with a battery on it, and from the westward and southwestward by the Spalmadori Islands.

The anchorage is in a depth of about 20 fathoms southwestward of the battery on Fabrica Point, with Galisnik Islet southeasterly about 400 yards, but steam vessels can anchor in about 12 fathoms, southward of the town. Vessels of light draft anchor in the port off the town. The port is much frequented, being in the route to Planka Point and to the various channels, and it is not unusual to see a great number of small craft here when the weather threatens.

The citadel is on a hill of marble which points out the position of the port from all directions; the town of Lesina is bordered by quays, is extremely well built, and is defended by several forts and batteries. It has a population of 2,200.

Lights.—On the southern side of Galisnik Islet an occulting light is exhibited from a stone tower, at an elevation of 36 feet above the sea, visible 7 miles.

A small fixed lantern light is exhibited from the wharf in Port Lesina, elevated 17 feet above the sea, showing red seaward and white toward the shore, visible 1 mile.

Breakwaters.—There are two moles, 20 yards and 114 yards long, respectively, for the use of small vessels.

Supplies.—Water and provisions may be procured; also timber for the repair of vessels.

The Spalmadori Islands.—The main body of these islands and rocks lies westward of Port Lesina, and they extend over a space $6\frac{1}{2}$ miles in length east and west by nearly $1\frac{1}{2}$ miles in breadth; in height they range from about 100 feet at the eastern end to 315 feet near the western end of Clemente, the center and by far the largest island of the group; the coast line of the whole is irregular and deeply indented with coves from end to end. The southern sides of the group are precipitous, of barren aspect, and should be given a wide berth, especially in bad weather, both on account of the outlying dangers and of the rapidity of the current through the narrow passages.

Vodnjak Islet (lat. $43^{\circ} 10' N.$, long. $16^{\circ} 19' E.$), the westernmost of the group, is about 800 yards in extent and 148 feet high, with several smaller islets or rocks and shallow water around its northern side.

Shoal.—About $\frac{1}{4}$ mile west-southwesterly nearly from Little Vodnjak, the western islet or rock, which is 49 feet high, and the same distance from the nearest part of Vodnjak, is a shoal with $2\frac{1}{2}$ fathoms water. This is the western danger of the Spalmadori Group and should be carefully avoided when rounding the islands.

Port San Clemente.—On the southern side, and nearly midway along Clemente Island, is the islet of Dobriotok fronting Port San

Clemente. The islet is 170 feet high, a cable from the southern horn of the bay, and connected with it by a flat with 4 fathoms water.

The bay is $\frac{1}{2}$ mile in length northwest and southeast and nearly $\frac{1}{2}$ mile in breadth, open to the westward, and affords shelter from all but westerly winds in a depth of 14 to 18 fathoms. In approaching Port San Clemente from the westward, Razanj Point, the southwestern extremity of the island, should be given a width berth, as shallow water extends 200 yards southward of it.

Stambedar Islet (lat. $43^{\circ} 09' N.$, long. $16^{\circ} 23' E.$), the southernmost of the Spalmadori Islands, is 102 feet high, lies 1,400 yards southeastward of Dobriotok Islet, and is about $\frac{1}{2}$ mile from the nearest point of Clemente Island. The southern side of this islet is steep-to, but the Planchetta Islets or rocks close to the eastward are surrounded by shallow water, and a rocky $2\frac{1}{2}$ -fathom shoal lies 450 yards eastward of Planchetta, and banks with $6\frac{1}{2}$ fathoms lie farther northeastward.

A vessel from the eastward passing along the coast should avoid these dangers, but may pass close to the southern side of Stambedar.

Girolamo Islet, the easternmost of the group, with the exception of Pokonjidol, is nearly 600 yards in diameter and 103 feet high, with a shoal extending more than 200 yards from its northern point. Rather more than $\frac{1}{4}$ mile off its southern side are two rocky shoals 300 yards apart, with 3 fathoms water on the western and $4\frac{1}{2}$ fathoms on the eastern shoal; there is deep water between the two shoals, and between them and the islet.

Rather more than 300 yards off the eastern side of the islet is another rocky shoal with 4 fathoms water, and from 13 to 17 fathoms between it and the islet.

Clearing mark.—The church of San Marco, at the head of Port Lesina, seen about midway between Galisnik Islet and the shore eastward of it, bearing north, leads eastward of the southern dangers and between Girolamo and the 4-fathom shoal eastward of it.

Light.—**Pokonjidol Islet**, about 200 yards in diameter, 36 feet high and fringed by a narrow bank, lies 1,200 yards eastward of Girolamo Islet and 500 yards from the shore of Lesina. On the islet is a lighthouse rising from the keeper's dwelling 48 feet high, from which is exhibited at an elevation of 68 feet above the sea a fixed red light, visible 10 miles.

Spalmadori Channel is the approach to Port Lesina from the westward. This channel, with depths of 32 to 37 fathoms, lies between the southwestern part of Lesina Island and the Spalmadori Islets. It is much frequented by coasting vessels as it is easy of access and exit with all winds and affords good shelter from the bora, although heavy squalls are often encountered. The current is strong,

and with easterly winds it is difficult to beat up to an anchorage. Westerly winds are often severely felt here.

There is anchorage for small vessels in the three little bays on the coast of Lesina westward of the town, and, in case of necessity, under the lee of the Spalmadori Islands.

Directions—Spalmadori Channel and Port Lesina.—There are only two good channels leading to Port Lesina; the western, between Cape Pellegrino and the westernmost of the Spalmadori Islands, and the southeastern, between San Andrea Point, Lesina, and Girolamo Islet.

Steam vessels leaving Port Lesina must not pass through the channel eastward of Galisnik Islet.

Spalmadori, the western channel, is a mile wide nearly all the way to the port, quite safe, and preferable to the other when the wind admits of its being taken. When approaching from the northwestward, Cape Pellegrino may be seen from a considerable distance, resembling a dark hill covered with trees; shortly afterwards the Spalmadori Islets will be distinguished opening out to the right of the cape; and, when abreast of the channel, San Andrea Point Battery, San Francesco Convent, and Veneranda Battery on Fabrica Point will be visible before the town is sighted. Cape Pellegrino and the southern coast of Lesina may be kept aboard if desirable.

The southeastern channel, between Girolamo, the western islet, and Pokonjidol Islet, though narrow, is convenient with easterly winds. It should not be attempted by a sailing vessel without a good leading wind. As soon as Fort San Nicolo (in ruins) is seen, 790 feet above the sea and about 1 mile northeastward of the entrance, it should be steered for, and the other forts and objects of the town will in due course come in sight.

Vessels of deep draft should pass about 300 yards westward of Pokonjidol Islet, with Fort San Nicolo bearing about 4° until the northern extreme of Gojca Islet is on with the northern extremity of Marinkovac, the island next westward of Girolamo; a vessel is then northward of the 4-fathom shoal eastward of Girolamo and may steer westward for the anchorage, giving the western side of Galisnik a berth of at least 100 yards.

When working up from the southward, the southern sides of the Spalmadori Islands should not be too closely approached on account of the current setting between them, and also to avoid the Planchetta Shoals.

Lissa, the largest of the out-lying islands, is $9\frac{1}{2}$ miles in length, east and west, and 4 miles in breadth. It lies southwestward of the Spalmadori Islands and is separated from them by the Lissa Channel, very deep and 6 miles wide between the two nearest points, viz,

Stoncica Point. Lissa, and Vodnjak Islet of the Spalmadori Group. It presents the appearance, from all directions, of an irregular hilly mass covered with trees; the highest peak, Mount Hum, 1,920 feet above the sea, is bare topped and surmounted by a small tower, and when seen from the southeastward, eastward, or northwestward presents two distinct hilltops on the lower of which is a chapel. The southern side of the island rises abruptly and is higher than the opposite side, toward which the land descends in gradual well cultivated slopes, on which are several towers. The shores are high and steep-to, except in the immediate vicinity of the southeastern shore.

Population.—There are about 10,000 inhabitants, who chiefly occupy the two principal towns, Lissa, at Port San Giorgio in the northeast, and Comisa, at the western end of the island; many of them are sailors and fishermen.

Trade.—Oil, wine, honey, and wheat, in small quantities, form the main produce, and considerable exports of sardines and of salt fish take place.

Telegraph cable.—A telegraph cable is laid from Smokova Cove at the northeastern end of Lissa Island, to the little inlet between Great and Little Palermo near the western end of Lesina, passing eastward of Vondnjak and between Parsanj and Lingua Islets of the Spalmadori Group.

North coast.—The coast between Port San Giorgio and Stoncica Point, the northeastern extreme of Lissa, $2\frac{1}{4}$ miles eastward of Hoste Island, is bold and steep-to, with several coves, Stoncica Cove, next westward of the point, being 1,400 yards deep. Stoncica Point slopes gradually seaward and has on it a conspicuous white lighthouse. The coast from Port San Giorgio to the northwestern point of Lissa, a distance of 7 miles, is also bold and steep-to with one or two small coves and an islet or rock close to the shore about midway; it is backed by high land which, near the western end and $1\frac{1}{4}$ miles from the northern coast, is 1,686 feet high.

Light—Stoncica Point.—From the lighthouse, 92 feet high, on Stoncica Point, is exhibited at an elevation of 125 feet above the sea, a revolving light visible 17 miles when bearing between 110° and 357° ; this latter bearing cuts some distance inside Greben Islet and some of the shoals on the eastern coast of Lissa.

Signal station.—About 80 yards southwestward of the lighthouse is the signal station, a building painted with black and white stripes, having on it a black mast with a yard. The signals used are those of the international code, and the station is connected with the telegraph system of the continent.

Weather signals.—The usual weather signals are made at this station, and the weather forecast communicated by the meteorological department is signaled gratis to vessels under way applying for it.

Port San Giorgio (lat. $43^{\circ} 04' N.$, long. $16^{\circ} 12' E.$), on the northeastern side of Lissa, is surrounded by hills; it is 1 mile in length, about 650 yards wide at the entrance between Hoste Island and the shore southeastward of it, 800 yards wide half way in, and 1,200 yards at the head of the port, with depths of from 25 fathoms in the outer part to 10 fathoms close in, having thus sufficient space and depth for all classes of vessels.

Islets in the approach—Vitelli and Vacca Rocks.—The northeastern and larger of the two Vitelli Rocks, 10 feet high, bears about 318° distant 1,500 yards from Hoste Island Lighthouse, and a reef extends 100 yards southward of it. At 250 yards southwestward of this rock is the smaller Vitelli, 3 feet high; there is a depth of 10 to 13 fathoms between them. A sunken rock with 3 fathoms lies about 100 yards 206° from the smaller rock; between this danger and the nearest point of land is a clear channel $\frac{1}{4}$ mile wide, with depths of from $6\frac{1}{2}$ to 15 fathoms.

Vacca Rock or Islet is 9 feet in height, and situated at $\frac{1}{4}$ mile from the coast on the eastern side of the entrance to Port San Giorgio, and about east 1,200 yards from Hoste Lighthouse; it is bordered by shallow water, except on the northwestern side, and there is a depth of 24 fathoms between it and the shore.

Hoste Island, on the west side of the entrance to Port San Giorgio is 400 yards in length, 69 feet high, bordered at each end by a bank, and has a lighthouse on its eastern end; it is separated from the western point of entrance by a passage 200 yards wide with 6 fathoms water in midchannel. This island acts as a breakwater in northerly gales.

The rocks and island just described present no difficulties whatever to navigation, except in thick weather, when they are not easily made out; it is nevertheless advisable not to pass too close to them without a commanding breeze, as the current generally sets toward them.

Lights.—From a white stone octagonal tower, adjoining dwelling, 37 feet high, 87 yards within the east end of Hoste Island, a fixed red light is exhibited at an elevation of 72 feet above the sea, visible 8 miles.

At the head of San Girolamo Pier, at the inner end of Port San Giorgio, a light, elevated 18 feet above the sea, and visible 2 miles, is exhibited from a lamp-post; it shows red to seaward and white over the inner harbor. Can not be lighted in northeast gales.

Anchorage.—Vessels of deep draft anchor in about 20 fathoms, sand and gravel, a little inside Schmidt Battery, on the eastern side of the entrance, and at an equal distance from the two shores; or, farther in, abreast of San Giralomo on the western shore, on which is a chapel and the arsenal, in about 14 fathoms, mud.

Vessels of light draft moor in the southwestern angle of the port close to the town of Lissa.

It is sheltered in every direction except from the northeastward, and Hoste Island at the entrance breaks the sea considerably, though during a bora much sea sets in, but the holding ground is good. Moor with open hawse to the northeastward. There are, however, several sets of moorings in the port which are generally placed at the disposal of foreign vessels of war calling here. A southerly gale at times comes on with but little warning.

Directions.—On arriving off Port San Giorgio, a chapel will be seen on an eminence at the head of the port, the fortifications on the hills near the entrance, of which the highest, Fort Wellington (584 feet), is on the port hand, and, on a near approach, Hoste Island Lighthouse and the out-lying rocks will be distinguished, and then the white houses of Lissa. If they can be seen, the higher of two towers on the starboard hand in line with the chapel on Mount Hum, leads toward the shore between the Vacca and Vitelli Rocks. Access is easy to a steam vessel.

The entrance to Port San Giorgio is difficult for a sailing vessel with southeasterly winds, as heavy squalls often render it impossible to carry sufficient sail. When making for this port from the eastward, it is advisable to keep at a distance from the high lands in order to avoid the strong sudden gusts which descend from them.

The town of Lissa has about 4,400 inhabitants.

Coal and supplies.—This is an Austrian Government coaling station where about 700 tons of Welsh coal is kept in stock, but this coal is only supplied to foreign vessels in cases of necessity. A small supply of Bosnian coal may, however, be obtained. Water is very scarce, and in the summer season is sometimes conveyed from Comisa. Provisions may be obtained; also the means of repairing vessels.

Telegraph.—There is a telegraph station here.

Port Carober, situated close westward of Port San Giorgio, is convenient for small craft when unable to reach that port; the anchorage is off a cove on the southern side, about one-third from the entrance toward the head of the bay. Between this cove and the entrance, the bottom is rocky and easterly winds are felt in their full force.

Lissa, West coast.—**Comisa Bay**, at the western end of Lissa, occupies a space of about $1\frac{1}{2}$ miles between Magnaremi Point on the north, and Stupiski Point on the south, and recedes 1 mile eastward; it is sheltered from all easterly winds by the high land round it, and is consequently a place of refuge from the bora and from southeasterly gales, but westerly and southwesterly winds send in a heavy sea, though it is in some degree protected from the latter direction by Busi Island.

The town, with 4,700 inhabitants, is in the northeastern corner of the bay and the anchorage is off it, but the water is deep and a vessel must go tolerably close in; the bottom is mud. Coasters moor in the cove protected by a mole. There is also anchorage $\frac{1}{2}$ mile southward of the mole, but farther on in that direction the bottom is rocky.

Water may be procured near the town from the fountain which occasionally supplies the inhabitants of Lissa.

Telegraph.—There is a telegraph station at Comisa. It is proposed to establish a radio station here.

Lights.—Small fixed red lights are shown, one at the head of the mole and one on the head of the breakwater extension.

Directions.—Mount Hum, near the southwestern extremity of Lissa, and Busi Island off Stupiski Point, its southwestern point, are good marks for this anchorage. The two Barjaki Islets, 19 feet high, close to the northwestern point of Lissa, may be rounded at a prudent distance. Northwesternly, distant $1\frac{1}{2}$ miles nearly from the inner and largest islet, is the Seket Bank, with $5\frac{1}{2}$ fathoms; and between it and the islet, about $\frac{3}{4}$ mile from the latter, is the Ploca Bank, with 5 fathoms. Both points of Comisa Bay are steep-to, but the land at Stupiski Point slopes gradually toward the sea and is covered with pine trees; and, near the shore on its western side, 400 yards northward of the point, is a sunken rock. Working up under the land, a vessel should be prepared for heavy squalls.

Comisa Bay and Port San Giorgio, being in the route of vessels traversing the Adriatic and westward of all the channels between the islands off this part of the coast of Dalmatia, are very important to the navigation of this sea.

South coast—Port Manego (lat. $43^{\circ} 01' N.$, long. $16^{\circ} 13' E.$).—The coast between Stupiski, the southwestern point of Lissa, and Ravnik Islet at the southeastern point, is rocky and inaccessible. Temporary shelter from the bora may be sought under it, but the anchor must be dropped very close to the shore. Ravnik Islet is 131 feet high and about $\frac{1}{2}$ mile in length; between it and the shore of Lissa, is the small anchorage of Port Manego which has a depth of 12 fathoms. It is exposed to northerly or southerly winds, and those from the southeastward send in a heavy sea, but the holding ground is good. The best berth is northwestward of the center of the islet, and the best passage to it is from the southwestward.

Dangers.—The coast between Ravnik Islet and the northeastern end of Lissa is bordered by a chain of islets, rocks, and shoals to the distance of about 1 mile, and should be avoided by a stranger. A rocky shoal with $5\frac{1}{2}$ fathoms water lies with the center of Ravnik Islet bearing 271° and Stončica Point Lighthouse 304° , distant $5\frac{1}{2}$ miles.

Busi Island rises abruptly about 2.3 miles southwestward of Lissa; it is $2\frac{1}{2}$ miles in length north and south, about 1 mile in breadth, hilly, and the highest part, toward the southern end and surmounted by the ruins of a castle (lat. $42^{\circ} 58' N.$, long. $16^{\circ} 00' E.$), is 627 feet above the sea. The shores are slightly irregular, the western side is straight, with several small coves, and the water everywhere deep; a sunken rock lies close to the northeastern point, and, though a rock above water close to the shore may be seen here and there, there are no outlying dangers. The island is inhabited.

The channel between Busi and Lissa Islands is deep and clear of danger, but Stupiski Point should be avoided as the westerly current sweeps suddenly round it and, in light winds, a sailing vessel might be set toward the coast of Lissa.

Blue Grotto of Busi.—This grotto is situated under the tongue of land enclosed by the Val Saladinac and the Val Balun, which is conical in shape, is wholly bare, and readily distinguished on account of its white color. The grotto is practicable for boats when the sea is smooth.

San Andrea Islet, about 12 miles westward from Lissa, has no bay or inlets affording refuge, and the numerous fishing boats which frequent it are obliged to seek shelter under its lee according to the varying winds. This islet is 2 miles in length east and west, about $\frac{3}{4}$ mile in breadth and 1,020 feet high, covered with wood, and with the ruins of a castle on it. A sunken rock lies close to its southwestern point; elsewhere the water is deep all around it.

Nearly $\frac{1}{2}$ mile westward of San Andrea is Wamik Islet or rock, which has deep water round it; midway between the two the water is deep, but the passage should not be unnecessarily taken as the current through is irregular.

At 1.7 miles from San Andrea Islet, and 138° from its northeastern extremity, is Brusnik Islet, 39 feet high, with two small rocks above water close to it on its southeastern side. The soundings midway between Brusnik and San Andrea are from 44 to 59 fathoms.

The currents in the vicinity of San Andrea and its islets are irregular and cause strong eddies, especially in winter, and the depth is too great for anchoring. The islets, therefore, should be avoided, especially in sailing vessels with light winds.

Pomo Islet lies west-northwestward from the summit of San Andrea, and is about $12\frac{1}{2}$ miles from the nearest part of that islet; being in the center of the Adriatic it is an excellent point of departure for vessels bound from the Italian coast to the vicinity of Planka Point or to the channels leading to Zara and Spalato; also, for those navigating this sea at a distance from its western shore. It is a barren, inaccessible rock, 314 feet in height, of reddish hue, and at a distance

at times resembles a vessel under sail. The soundings in the immediate vicinity of Pomo Islet are from 40 to 50 fathoms.

Pomo Rock (lat. $43^{\circ} 06' N.$, long. $15^{\circ} 26' E$), at $1\frac{1}{4}$ miles northwesterly from Pomo Islet, is a rocky shoal with $3\frac{1}{2}$ fathoms water. The soundings round this danger are from 30 to 40 fathoms, and $\frac{3}{4}$ mile southward of it about 100 fathoms.

CHAPTER IX.

COAST OF DALMATIA FROM CAPE GOMENA TO THE GULF OF CATTARO, AND ADJACENT ISLANDS.

Between Cape Gomena, the northwestern extremity of the Sabbioncello Peninsular and the entrance of the Gulf of Cattaro, is a distance of nearly 80 miles. The shore is backed at a short distance by mountainous land with but little intervening space of cultivated ground. Oil, and wine which is considered the best in Dalmatia, are the chief products. The occupation of the inhabitants, generally, is maritime commerce.

Curzola, Meleda, and Lagosta are the three principal adjacent islands; the others are either thinly peopled or uninhabited. The bays formed by them contain abundance of fish, especially sardines and mackerel, but the shores being destitute of fresh water they are seldom visited.

Sabbioncello Peninsula.—This singular peninsula, whose northern and eastern coasts were described in the preceding chapter, leaves the coast of Dalmatia at an acute angle in a northwesterly direction and is about 36 miles in length, with an average breadth of 3 miles. Mount Vipera, (lat. 43° 00' N., long. 17° 09' E.), its highest point, rises in a conspicuous hummock 7½ miles from Cape Gomena, its northwestern extremity, and attains a height of 3,150 feet above the sea; it may be considered the commencement of two chains of mountains, the base of the northern chain forming the southern side of the Narenta and Stagno and Piccolo Channels; while the base of the southern range is washed by the waters of the Sabbioncello and Meleda Channels. Uniting near the middle of the peninsula they are followed by the Giuliana Valley, a sudden and remarkable depression in the land, visible from a great distance seaward, which, owing to the violence of the bora, has a desolate, dry, burnt appearance. Southeastward of the valley, the land again rises and Mount Carovic, about 4½ miles beyond the village of Guiliana, is 2,070 feet high.

Curzola Channel includes the space between the northern side of Curzola, and the southern sides of Lesina Island and western extremity of the Sabbioncello Peninsula. Although of considerable breadth, it was not formerly much used, as it did not lead to any

point of commercial activity on the Dalmatian coast, but the now considerable importance of the Narenta as a means of communication with the interior has probably brought this channel into more common use.

Coasting vessels ordinarily hug the Lesina shore, passing northward of Torcola, especially when anticipating contrary winds, to be in a position to anchor, if necessary, in Porto Grande of that island. The general depth of this channel is from 35 to 40 fathoms.

Planchetta Islet (lat. $43^{\circ} 02' N.$, long. $16^{\circ} 49' E.$), situated about 4 miles off the north side of Curzola Island, is about 800 yards in length, narrow, 43 feet high, and bordered by a narrow bank with a reef extending from either end, the southeastern extremity of which reef breaks. When seen from the northwest or southeast, it has the appearance of two islets. It should be approached with caution.

Light.—On the northwestern extremity of Planchetta Islet a fixed red light, visible 8 miles, is exhibited from a turret adjoining dwelling, 82 feet high, at an elevation of 111 feet above the sea.

Sabbioncello Channel.—The eastern portion of the Curzola Channel unites with the Sabbioncello Channel, which lies between the Sabbioncello Peninsula and the northern coast of the eastern end of Curzola. It is frequented by small vessels trading to the coast of Dalmatia, and affords good anchorage throughout for vessels of any size about $\frac{1}{2}$ mile from the coast, in depths of 18 to 24 fathoms sand, care being taken to avoid the telegraph cable. In navigating this channel, the chart and eye must be the guides. There is often a strong westerly current.

Port Luka lies at the western end of the Sabbioncello Peninsula, north side of approach to Sabbioncello Channel, between Cape Gomena and Ossit Point; the best sheltered part is in a cove at the northeastern angle, where small vessels anchor in a depth of 6 or 7 fathoms and secure to the shore. Shallow water extends 700 yards from Bila Point, on the southern side of entrance to the port, and a 4-fathom rocky shoal lies in the fairway about 800 yards from the shore on the northern side of entrance. With contrary or light winds, vessels unable to stem the westerly current in the Sabbioncello Channel find this a convenient temporary anchorage.

Northern shore.—**Rosario Road**, situated about 1 mile within the west entrance of the Sabbioncello Channel, is a most eligible anchorage, as there are none on the northern coast of Curzola. A vessel may anchor in a depth of about 11 fathoms mud, and small craft farther in on a weedy bottom, where they make fast to the shore, which is bordered by a narrow bank.

There is a copious spring of water near the Monastery of Rosario, or Viganj, to which the inhabitants of Curzola have recourse in times of drought.

Kuciste Road.—This anchorage is about 1.3 miles from Rosario Road, in the eastern part of the bend of the shore and about $\frac{1}{2}$ mile eastward of Kuciste Chapel; here also are means of securing a vessel to the shore. Kuciste is a telegraph station. Beyond Kuciste, about 1 mile westward of Orebic, is a similar anchorage, marked by some houses overlooked by a Franciscan monastery on the eastern side.

Orebic.—Vessels may also anchor off Orebic, a village of some importance near the eastern entrance of the Sabbioncello Channel, but shoal water extends too far off to allow them to make fast to the shore, hence the existence of a mole which extends 200 yards southwestward and off which, at about 200 yards, is a mooring buoy in 5 fathoms; a second mooring buoy lies closer in, in $2\frac{3}{4}$ fathoms.

Orebic is a telegraph station; its inhabitants, numbering about 600, are chiefly seafaring men.

Lights.—A fixed red light, elevated 18 feet above the sea, visible 6 miles, is exhibited from an iron standard on the molehead at Orebic.

Telegraph cable.—Between Kuciste and Orebic, at 1,100 yards eastward of Zamostje Point, the telegraph cable joining the Sabbioncello Peninsula with the town of Curzola, leaves the shore, the position at both ends being marked by small turrets.

Terstenik Bay.—This bay, about $1\frac{1}{2}$ miles eastward of Orebic Mole, is $2\frac{1}{4}$ miles wide, and is open to the southward. The western half of the bay is shallow, the 5-fathom curve being 800 yards from the shore.

From Terstenik Bay, at the eastern entrance to the Sabbioncello Channel, the shore trends southeastward to Dingac Islet at the entrance to Giuliana Bay, a distance of about 8 miles. With the exception of one or two shoal spots close inshore, the water is deep throughout.

Giuliana Bay.—The center of this bay is about 9 miles southeastward of Terstenik Bay, and about the same distance eastward of the eastern extremity of Curzola Island. The bay is $3\frac{1}{2}$ miles wide; close to the shore at its northwestern point is Dingac Islet, and off Provizda, its southeastern point, is Alessandria Islet, the bay falling back $1\frac{1}{2}$ miles with deep water throughout, except one sunken rock about 400 yards from the outer of two islets off Vucine Cove in the southeastern part of the bay. This bay, with that on the opposite side of Sabbioncello, here contracts the width of the peninsula to $1\frac{1}{4}$ miles and, with the exception of the isthmus between Stagno and Stagno Piccolo, is its narrowest part, the high land on the northern side falling suddenly and forming the conspicuous valley before alluded to and known as the Giuliana Valley.

Port Terstenik (lat. $42^{\circ} 53' N.$, long. $17^{\circ} 26' E.$).—In the northeastern corner of Giuliana Bay is Port Terstenik, a small

cove resorted to by coasters in the summer season—the only time when it can be considered safe; these anchor at the entrance in 16 fathoms and lay out cables to the shores eastward and westward against the violent gusts of the bora descending from the Giuliana Valley. Here they are partially protected from the eastward by Zaglavak Point, a small rocky peninsula, and are well sheltered from westerly winds; those, however, from the southward send in a considerable sea. Near a projecting point in the middle of the bay is a small church, westward of which is the ordinary anchorage abreast of some stone houses on the beach. There is a mooring buoy off the molehead.

Telegraph.—There is a telegraph office at the village of Terstenik open during certain hours of the day.

Lights.—From the end of the breakwater at the head of Port Terstenik in Giuliana Bay, elevated 16 feet above the sea, is exhibited a fixed red light, visible 3 miles. This light must be left to port by vessels entering. There is a flashing light exhibited from a gray stone tower on the western point of Alessandria Islet, visible 16 miles between 293° and 233° . (See Light List.)

Southern shore.—**Port Racisce**, on the southern side of the west entrance to the Sabbioncello Channel, is a small cove open to the northward, with depths of 6 to 12 fathoms, mud, in the center; the small vessels which visit the port secure to the shore. The town of Racisce is built around the head of the cove; it has 850 inhabitants. There is a mooring buoy in $4\frac{1}{2}$ fathoms off the molehead.

Light.—From the molehead at Racisce a fixed red light, elevated 18 feet above the sea, is exhibited, visible 2 miles.

Telegraph.—There is a telegraph station at Port Racisce.

Kneza Bay.—Rather more than $1\frac{1}{2}$ miles eastward of Port Racisce and just within the south side of the entrance to Sabbioncello Channel lies Kneza Grande Islet off a point of the same name projecting eastward and together covering this small bay from westerly and northerly winds; small craft anchor in a depth of 3 to 5 fathoms, muddy bottom; there is 2 fathoms water between the islet and the point. The islet should not be too closely approached, and between it and San Giovanni Point on the mainland is the narrowest part of the Sabbioncello Channel which is here only about $\frac{1}{2}$ mile wide.

Light.—A fixed white light (unwatched), elevated 44 feet above the sea, is exhibited from an iron tower, 25 feet high, on the northeast side of Kneza Grande Islet, visible 8 miles.

Beacon.—At $2\frac{1}{2}$ miles eastward of Kneza Bay and 200 yards from the eastern point of Verbovica Cove, is Verbovica Shoal with 2 feet water; it is marked by a beacon 15 feet high.

Port Curzola and town.—At $3\frac{3}{4}$ miles eastward of Kneza Islet is the town of Curzola standing on a small peninsula and defended by

a fort in the rear. It is the chief place of export for the produce of the island and contains about 2,100 inhabitants. Port Curzola, the small bay on the western side of the town, affords accommodation for coasters, but they are exposed to northerly and westerly winds, and in the bora season there is but little security. Two mooring buoys lie in the center of the bay.

At the inner end of the new mole at Curzola is a flagstaff, which takes in signals from Sestrice.

Telegraph cables.—Curzola communicates with Sabbioncello Peninsula by a cable crossing the Sabbioncello Channel from the northeastern point of the town; both shore ends are marked by beacons or small turrets.

Curzola is also connected with Lagosta by submarine cable, laid between Stiniva Cove on the south shore of Curzola to St. Michele in Lagosta. Anchorage is prohibited on or near the line joining these places. The points on the shore are each marked by a white stone pyramid.

Lights.—A fixed red light, elevated 20 feet above the sea and visible 3 miles, is exhibited from the molehead at Curzola; it may be seen nearly the whole length of the channel westward and eastward.

A fixed green light, visible 2 miles, is shown from the angle of the health office.

Port Pedocchio, on the eastern side and southward of the town of Curzola, is an inlet about 800 yards deep with 9 fathoms water in the middle, suitable for small vessels and sheltered from all winds. There is a mooring buoy outside the western entrance point.

Port Badia.—Fronting the northeastern shore of Curzola Island, and encumbering the eastern entrance to Sabbioncello Channel, there is a cluster of islets, rocks, and shoals; of these, Badia Islet, the largest, with Planjak, Kamenjak, and Petrara, three other islets on the south, form with the coast of Curzola the well sheltered anchorage of Port Badia, also known as the Jezuviza Channel, which, though narrow, is nearly 1 mile in length, with a depth of from 7 to 12 fathoms.

Badia Islet is connected with Curzola by a ridge over which 2½ fathoms water may be carried into the port. Between Badia and Planjak there is only 1 fathom water, and between Planjak and Kamenjak the depth is 2 fathoms, but with a rock above water on a shoal occupying half the space in mid-channel.

Beacons.—Between Badia and Planjak a cylindrical beacon with iron rod and skeleton ball on a square base of masonry 3 feet above the sea, and erected in 4 feet water, marks the Badia Rock; a similar beacon in 5 feet marks Planjak Rock; and, in order to indicate that there is no passage between Badia and Planjak Islets, a third beacon

is erected between the other two. Off the northern side of Badia Island and west 500 yards from Lucnjak Islet is a shoal marked by a beacon in masonry, and southeastward nearly 400 yards from Rogacic Islet off the eastern end of Badia is a shoal with only 6 feet water.

Directions for Port Badia.—In approaching Port Badia from the northward, Kriz Shoal with 2 fathoms water about 300 yards off the western point of entrance, should be avoided by keeping either shore on board. This entrance is only available for vessels under 15 feet draft.

In entering from the southward, a vessel passing inside of Sutvara Island must be careful to avoid the shoal northward of Gudbovac Islet marked by a beacon consisting of an iron staff and two open disks placed crosswise, in one fathom water. Badia convent open of Planjak Island, bearing 307° , leads in mid-channel through this approach to the southern entrance.

Thence the channel is between Planjak and Kamenjak Islets on the one side and Petrara Islet on the other, but Krastovica Reef nearly in the fairway and occupying more than half the channel should be avoided by keeping Sestrice Lighthouse in line with the northwest point of Gojak Islet, bearing 53° , which leads midway between Planjak Islet and Krastovica Reef, in about 4 fathoms; thence between Kamenjak and Petrara, hauling to the northward round the former for the anchorage.

Islets and rocks.—There are several islets, eastward of those forming Port Badia, lying in the eastern entrance of the Sabbioncello Channel; the principal are Sutvara, 118 feet high and woody; Bisaza, 39 feet high; Maizan, also woody and 102 feet high; Gojak, 46 feet high; and the two Sestrice Islets. This end of the Sabbioncello Channel is marked at night on the southern side by the white light on the northwestern Sestrice Islet and by the red light on Curzola mole; and on the northern side by the red light on Orebic mole. (See Light List.)

Lights.—On the larger or northwestern Sestrice Islet is a white square lighthouse with dwelling attached, 40 feet high, from which is exhibited, at an elevation of 58 feet above the sea, a fixed white light, visible 11 miles.

On the landing mole at Port Lombardo (Lombarda), on the northeast coast of Curzola Island, about $1\frac{1}{4}$ miles westward of Cape Speo, a fixed red light is exhibited, visible 3 miles.

Directions for the Sabbioncello Channel.—When making for the passage from the westward, Mount Vipera on Sabbioncello Peninsula is a good mark. The approach between Ossit Point on the north and the town of Racisce on the south is clear of danger and

readily recognized. Ossit Point at a distance appears to be a detached islet; St. Giovanni Point, high and with a convent on it, will be next seen on the north, and Kneza Point, the south point of the entrance, which is woody and of moderate height, on the south. Between these points the narrows, about $\frac{1}{2}$ mile wide, is clear and deep.

Proceeding eastward a vessel may anchor in Rosario or Kuciste Roads or pass through the eastern end of the channel with the Sabbioncello shore aboard, keeping northward of all the islets and dangers. At night, the red light of Curzola and the white light of Sestrice Islet will be left on the south and the red light of Orebic on the north.

Entering the channel from the eastward, the Sabbioncello shore should be closed with, and a course steered northward of all the islets at the entrance; or, with a fair wind, the passage northward of Bisaza and between Badia and Maizan may be taken.

The ordinary set of the current through the channel is westward and its velocity is sometimes considerably accelerated by strong easterly winds. Northerly and northeasterly winds are dangerous to sailing craft, the northern side of Curzola, when westward of Ossit Point, being then a lee shore and affording no shelter; it is advisable to close with the southern side of Lesina and, if necessary, either anchor in the Torcola Channel or run under the lee of Curzola. With southerly winds, either Port Lesina, Torcola, or Port Luka may always be reached.

Curzola Island (ancient Corcyra Nigra) is one of the most important islands on the coast of Dalmatia. It is nearly 27 miles in length and from $3\frac{1}{2}$ to 4 miles in breadth, with a chain of mountains covered with oak and pine trees, suitable for shipbuilding, extending from one extremity of the island to the other. The most remarkable elevation, Mount Dobrovaska, is 1,863 feet high and presents either a conical or a forked summit, according to the direction from which it is viewed. The inhabitants are few in proportion to the area of cultivable ground; their chief occupation is shipbuilding and fishing; the vine and olive are grown. There are bridle roads from the various anchorages to the interior.

The coasts generally have deep water close to. The anchorages at the western end are convenient for vessels navigating the eastern shore of the Adriatic, especially when overtaken by heavy southerly winds.

Proisd Island.—This island is about $\frac{3}{4}$ mile in length, 79 feet high, and lies off the northwest extremity of Curzola, from which it is separated by a boat channel with 6 feet water about 300 yards wide. The western end of Proisd is bordered by a rocky spit extending $\frac{1}{4}$ mile offshore; the shoal water between this island and Curzola extends

northward and has on it an islet or rock, beyond which, about $\frac{1}{2}$ mile from Proisd, is Bacili Rock, 19 feet high, with 11 fathoms water between it and the other rock mentioned. At $1\frac{1}{4}$ miles eastward of Bacili Rock and $\frac{1}{4}$ mile from the shore is Gorcik, a little islet 23 feet high.

A flashing light, visible 11 miles, is exhibited at Proisd Point, the western extremity of Proisd Island. (See Light List.)

The north coast of Curzola Island from Gorcik Islet eastward to about opposite the western extremity of the Sabbioneello Peninsula is sparsely inhabited and covered with trees. The coast line is bold and irregular with several coves, but affording no shelter whatever for large vessels. The water is everywhere deep, and there are no hidden dangers except a sunken rock close to Prohodistce Point, 6 miles westward of Port Racisce; and the Naplovac Rocks, 19 feet high, and Blaca Rocks, close to the shore but with deep water between them and it. Coasting craft seldom approach this coast, as with northerly winds it is a dead lee shore with no anchorage.

Prigradica Cove, about 0.7 mile westward of the western Naplovac Rock, is a small indentation of the coast, from the southeast side of which a mole projects in a northwest direction, inside which small craft may find shelter.

The north coast of Curzola farther eastward is included in the description of Sabbioncello Channel.

Light.—From the mole end in Prigradica Cove a fixed red light, elevated 19 feet above the sea, is exhibited, visible 3 miles between the bearings 321° and 257° . Can not be lighted in strong northeast winds.

West and south coasts.—**Grande (Vallegrande) Bay** occupies the whole western end of Curzola Island between Proisd and Kenirat Points, and has good anchorage for vessels of any size. The town of Valle Grande, where there is a telegraph station, is at the head of the bay.

The best anchorage for large vessels is east of Ossiak Islet. The available space is nearly a square $\frac{1}{2}$ mile, with depths of from 18 to 26 fathoms, sand, and well sheltered, being open only to winds from west-northwest. The most secure place in the bay for small vessels is Plitvine Cove, an indentation on the northern side of the bay. Here they anchor in 8 to 13 fathoms, sand and mud, and make fast to the weather shore. There is also anchorage for small vessels off the town in from 6 to 12 fathoms, and higher up in a narrow and landlocked arm in depths of 2 to 3 fathoms. There is a mooring buoy in $3\frac{1}{2}$ fathoms water off the quay.

Ossiak Islet, in the entrance, is 800 yards in length east and west, 400 yards in breadth, 213 feet high, and is covered with bushes.

Port San Giovanni.—About 1,200 yards northward of the west end of Ossiak Islet is the small port of San Giovanni, which has a depth of from 2 to $2\frac{1}{2}$ fathoms and is much visited by coasting vessels, being conveniently situated for getting under way. A peninsula of the same name, with a church on its summit, and joined to the shore by a narrow rocky neck, forms its southern side; the entrance is divided into two passages by San Giovanni (Gubessa) Islet, northward of which is the proper channel, where also there is a strong out-draught at the commencement of the ebb tide.

Kamenjak Islet.—About 1 mile northwestward of Ossiak Islet is Kamenjak Islet, 49 feet high, and about 800 yards 254° from the latter is a shoal with $3\frac{1}{2}$ fathoms water; about 1,400 yards 282° from the same islet and off a point projecting from the northern side of the bay, is a 5-fathom patch.

Lights.—On **Vranac Point**, at an elevation of 24 feet above the sea, a red light is exhibited from an iron post, visible 4 miles.

On Kamenjak Islet a group flashing red light is exhibited; obscured by land from 163° to 233° .

A fixed green light is shown from the west side of landing mole. (See Light List.)

Directions.—Mount Hom, a conical hill completely covered with trees, rises 1,237 feet above the sea immediately over the southern side of Vallegrande Bay and indicates its position. On approaching the land, the high wooded point of Kenirat on the southern side of entrance, and Proisd Island on the north, will be readily recognized and a course may be steered for Ossiak Islet, leaving Kamenjak Islet and the $3\frac{1}{2}$ -fathom shoal on the port hand; both sides of Ossiak are clean.

Potplat Cove.—On the southern side of Vallegrande Bay is Potplat Cove with a depth of 8 to 13 fathoms; it is exposed to westerly winds and the holding ground is bad.

Coast—Tre Porti.—Between Kenirat Point and Cinca Point, 2 miles southeastward of it, the coast is high with two small coves; northward and eastward of Cinca Point is an inlet with the port of Tre Porti at its head, the westernmost anchorage on the southern coast. It has room for small coasting vessels only.

Extending 2 miles in a southeasterly direction from Cinca Point are four islets; Terstenic, the nearest to the point and the largest, is 65 feet high; between it and the point is a clear and deep channel 400 yards wide leading into the port. Between Terstenic and the second islet the channel is rather wider and also deep and clear.

Prznjak, the third islet, is 85 feet high and united to the second islet by a flat with only 2 fathoms water. Lukovac, the outer and smallest of the four, is 55 feet high, and midway between it and

Prznjak the depth is 14 fathoms, but the Gredica Rock, 6 feet above water, lies in midchannel in the inner part of the passage. These islets cover Port Tre Porti and break the sea.

Islets—Anchorages.—At 1.3 miles northeastward of Lukovac Islet there commences a chain of islets, rocks, and shoals, which skirt the coast for $4\frac{1}{2}$ miles eastward; Zvirinovic, the westernmost and largest of these islets, at a distance appears as two, having two peaks 216 and 199 feet high, respectively; between these islets and the shore small vessels find excellent shelter.

Port Carboni is between Zvirinovic Islet and the coast of Curzola; it is about 1 mile in length, less than 275 yards in width, with a depth of from 7 to 14 fathoms, weedy bottom, and is secure from all winds. The ordinary anchorage is abreast some fishermen's cottages, from which a road leads to the town of Blatta. Carboni is generally preferred by vessels wind bound in this part of the Adriatic, as its two passages enable them to quit with any wind. Firewood is the only supply obtainable.

Directions.—When approaching Port Carboni from the southward, Mount Kula, 1,037 feet high, bearing about 355° , indicates the position of the eastern entrance. When intending to enter by this channel, Obiak Islet, 150 feet in height, which is sugar-loaf shaped and covered with bushes to the top, will be recognized and the vessel should pass between it and Zvirinovic, keeping the eastern end of Zvirinovic Islet aboard to avoid a $4\frac{1}{2}$ -fathom shoal in the middle of the channel. Gubessa Islet, a large rock 51 feet high farther in, should be left on the port hand; but it is steep-to and in case of necessity may be passed on either side.

When bound to Carboni from the westward, either of the channels already described between the islets off Cinca Point may be taken, but the current is rapid between these islets and should be considered in approaching them.

Port Tre Pozzi.—Between the coast of Curzola and the four easternmost islets of the rocky chain is a channel nearly 800 yards wide, known as Port Tre Pozzi and affording good anchorage in a depth of 16 fathoms, sand and gravel. Westerly and southeasterly winds send in a considerable sea.

Directions.—When bound to Port Tre Pozzi its position may be known by Mount Morkan which rises to a height of 1,060 feet within $\frac{1}{2}$ mile of the northern shore of the port. The four islets forming its southern side, when seen at a distance, present a low whitish line, standing out in relief from the dark ground of Curzola. Vessels visiting Port Tre Pozzi should never pass between the islets, the spaces being very narrow, the current strong, and the depth of water only from 2 to 4 fathoms.

The eastern entrance to the port is between Verkovnjak Islet, 102 feet high, and Otocac Islet, which is close to the shore and united with it by a 2-fathom ridge; there are shoal patches of 4 and 4½ fathoms in this entrance to the anchorage, which, in a vessel of deep draft, should be avoided. The best anchorage, about 17 to 18 fathoms, is opposite Sridnjak, the middle of the three largest islands.

The western channel is between Kosor and Stuppa Islets, 1,800 yards apart; in this channel there is a 3-fathom patch, a 2½-fathom patch, and Beretta Rock 6 feet high between Prisba Point and Stuppa Islet, to be avoided; for the position of these dangers, as well as for those in the eastern entrance, the seaman is referred to the chart as the best guide.

Port Berna, on the northwestern side of Veli Zaglav Point, has good anchorage for vessels of light draft in a depth of 3 to 5 fathoms, sandy bottom, at the head of the eastern arm. The customary precautions should be taken against the bora; cables are generally carried to the shore. Larger vessels anchor farther out in 20 fathoms. Veli Zaglav Point is 240 feet high and well wooded; a rocky shoal with 3 fathoms water lies 300 yards westward of the point, which should have a wide berth in rounding.

Port Berna Light, is a fixed red light on the north side of the harbor; visible 3 miles.

From Veli Zaglav Point to Cape Speo, the shore is rocky and steep-to, uninhabited, thickly wooded, and, with the exception of a few coves, without a single place of shelter.

Coast.—The south coast of Curzola, eastward of Port Berna, to Cape Speo, the east extremity of the island, is steep-to in most places, but there are a few coves available to small coasters with off-shore winds.

Cape Speo, the eastern extremity of Curzola Island, and southern point of the eastern entrance to Sabbioncello Channel, is 3¼ miles distant from the nearest land of the Sabbioncello Peninsula, and from it the western extremity of Meleda Island, bears about south-southeast, distant 9½ miles. With the exception of a 2-fathom shoal extending 100 yards southeastward from the cape, the water is deep in all directions around it.

Cazza Islet is the westernmost of the chain of islands, islets, and rocks on the south side of Lagosta Channel; it is uninhabited, except occasionally in the summer by shepherds who find pasture for their flocks. It is nearly 2½ miles in length, 797 feet high, and steep-to all round; the southern side is lower than the northern, and on the eastern side is a bay sheltered from northerly and westerly winds, but which is not a safe anchorage, and a vessel caught in a bora off the island should, if possible, make for Lissa Island; failing in the

attempt, the Gulf of Manfredonia on the Italian coast, between 60 and 70 miles to the southward, would be the best shelter to run for.

Light.—On Point Trisavac, the southwestern extremity of Cazza Islet, is a quadrangular lighthouse painted red and white in vertical stripes, rising from the center of the keeper's dwelling. From it is exhibited at an elevation of 308 feet above the sea, an occulting white light showing a flash every six seconds, visible 24 miles. The light is obscured by the land from the northeastward between the bearings 213° and 253° .

Cazziol Islet, situated 10 miles eastward of Cazza, is 305 feet high; it is uninhabited and covered with brushwood and stunted trees. The shore is steep and the soundings round it, though irregular, are generally deep. At little more than 800 yards off the southwestern point of the islet, is a rocky 2-fathom shoal. In southerly winds fishing vessels resort to Lenard Cove, a small bay on the northern side of the islet, which has a depth of from 12 to 17 fathoms, sand, with a sunken rock close to the western point of entrance. The southeastern side is the best for landing.

Biclaz is a small round islet or rock 52 feet high, steep-to, and distant $1\frac{1}{2}$ miles 291° from the western end of Cazziol; 600 yards eastward of the rock is a 10-fathom patch.

Lokovac (Pod Kopiste), a small islet 98 feet high and steep-to, lies $\frac{1}{4}$ mile northward of Cazziol.

Cernac, another rocky islet 46 feet high, lies about $\frac{1}{2}$ mile eastward of Cazziol; there is a 9-fathom patch $\frac{1}{4}$ mile 49° and an 8-fathom patch 26° 1 mile from this rock.

Markiara Islet (lat. $42^{\circ} 46' N.$, long. $16^{\circ} 47' E.$), situated nearly $2\frac{1}{2}$ miles eastward of Cazziol, is about $1\frac{1}{4}$ miles in length north and south; it is 397 feet high and is composed of several small woody hillocks; its seaward shores are steep, especially on the southwestern side, and the water deep. There are no hidden dangers in the channel between it and Cazziol, but the current is rapid.

Pod Markiara is a small islet 52 feet high $\frac{1}{2}$ mile off the northwestern face of Markiara; the northwestern side of this rock is foul and should have a wide berth.

A rock about 100 yards in extent with $5\frac{1}{2}$ fathoms of water lies 1 mile nearly south-southwest from Pod Markiara Islet.

Markiara Islet is separated by a narrow channel from Priestap Island eastward of it; there are two little islets or rocks on the shoal extending from Markiara in the northern part of the channel, and the least depth in midchannel is $5\frac{1}{2}$ fathoms.

Priestap Island (lat. $42^{\circ} 46' N.$, long. $16^{\circ} 44' E.$), forms with the western end of Lagosta the ports of Lago Grande and Lago Piccolo; the island is 1.7 miles in length, 508 feet high, and sepa-

rated from Lagosta by a very narrow channel over shallow rocky ground, by which small vessels of light draft pass at high water from Lago Grande on the south to Lago Piccolo on the north. The current between Priestap and Lagosta is strong.

Lagosta Island, ancient Ladestum.—This island is generally made by vessels passing either up or down the Adriatic. It is 6 miles in length east and west, high, and with a peak near the center; the highest parts are well wooded, except seaward, where they are steep and barren. Mount Hum, the highest part of the island, is 1,368 feet above the sea and covered with pine trees; St. Giorgio Chapel stands on its summit. Mount Debelo Blezevo is another peak equally remarkable and nearly as high, about $\frac{1}{2}$ mile southward of Mount Hum. The shores of the island are bold, and, with the exception of the southeastern side, are irregular, with deep water and several rocky heads, to avoid which the chart must be the guide. There are about 1,400 inhabitants, of whom many are fishermen. Wine, oil, firewood, and salt fish are the chief articles of commerce. The only village, Lagosta, is on one of the highest hills on the northern side; it is defended by a fort on a conical hill eastward of it.

There is a lighthouse on Skrigeva Point, the southern extremity of Lagosta Island. (See Light List.)

Port Lago Grande is formed between the southern part of Priestap Island and the western end of Lagosta; it has sufficient space for a number of vessels secure from all winds. The entrance is between Barbaros Point, Priestap Island, and Baskerat Point, off which a sunken ledge extends 140 yards; the navigable channel is about 500 yards wide.

Near the center of the harbor is St. Raffaele Islet, 82 feet high and with a church on it; the anchorage is either northward or southward of the islet, in depths of 16 or 26 fathoms, sand and shell. Small vessels may moor in the coves of Priestap, or in St. Pietro Bay on the southeastern side of the port.

Water may be had at St. Pietro Bay, near a church, but it is brackish and indifferent. Firewood is the only other article procurable.

Directions.—There are three passages into this port; viz., between the shoal off Baskerat Point and Bratinottok (Bratin Otok) Islet; between the latter and Vlassenik (Vlasnik) Islet; and between Vlassenik Islet on the one side, and Markiara and Priestap Islets on the other. Irregular currents of wind frequently occur among this group of islets.

Cazziol Islet and Mounts Hum and Debelo Blezevo on Lagosta are good marks when approaching from the westward. Bratinottok

Islet is 262 feet high, wooded, of whitish appearance, steep on the southern side, and may be recognized at some distance; Baskerat Point may be known by large red patches on its southern side.

Both winds and currents are frequently irregular and strong between Lagosta and the islets and rocks westward of it.

Port Lago Piccolo is an indentation at the northwestern end of Lagosta Island; it is protected on the west by the northern part of Priestap Islet and by the little islet of Maslenjac, which is covered with bushes, off its northern point. The passage in is clear and deep, 300 yards wide, and leads to a landlocked anchorage about 600 yards square with a depth of 20 fathoms, and room farther in for small vessels in 8 or 9 fathoms, thus affording good shelter from the Bora, but difficult of ingress and egress in a sailing vessel.

Prihodisce, the eastern point of entrance, is 223 feet high, the land immediately within it falls to 12 feet and rises again to 237 feet in height, causing the point at a distance to appear as an island.

Coast—Port Chiave.—The northern coast of Lagosta is deeply indented with bays and coves; of these, Port Chiave is the anchorage chiefly resorted to by coasting vessels for the convenience of its vicinity to Lagosta Village, about 1 mile eastward of it.

A small islet or rock at the entrance affords partial protection from the northward; the channel is on the eastern side of the islet, as a reef of rocks nearly awash lies between it and the western shore. The anchor should be dropped near the middle in 5 or 6 fathoms, mud, and a hawser taken to the islet. In this position only northerly and northeasterly winds are much felt.

Port San Michele is about $\frac{3}{4}$ mile to eastward of Port Chiave. A fixed red light, visible 4 miles, is exhibited from the molehead at Port St. Michele, Lagosta.

Telegraph cable.—A telegraph cable is laid from the shore near St. Michele Islet to Stiniva Cove, Curzola.

South coast of Lagosta—Port Rosso.—This small landlocked port is at the northeastern angle of the large bay on the southern side of Lagosta; the depth in the center of the port is from 5 to 6 fathoms, mud, with only $3\frac{1}{4}$ fathoms at the entrance, which is too narrow to be taken without a leading wind.

The bay in which the port lies has sufficient space and depth for vessels of the deepest draft, but it is not a safe anchorage and should be resorted to only in a bora or during westerly winds; those between southwest and southeast blow dead in and raise a heavy sea. The only spot which can be recommended as shelter in a gale is in a depth of 18 fathoms under the lee of the high land of Skrigeva Point, on the eastern side of the bay.

Skrigeva Point Lighthouse.—See Light List.

Signal station.—The lighthouse is connected with the telegraph system. Vessels may communicate by the International Code.

Directions.—When entering Port Rosso with southerly or southeasterly winds, vessels under sail should be prepared for eddy winds from the high land. Skrigeva Point may be rounded closely when arriving from the eastward; and Svegliegamora, the western point, when arriving from the opposite direction. Care must be taken to avoid a rocky shoal in the bay with 1 fathom water, situated about 1,450 yards eastward of the western point and about 700 yards from the shore. There is also a shoal with $4\frac{1}{2}$ fathoms northeastward of the 1 fathom patch and about 500 yards from the shore in the middle of the bay; and another with $1\frac{1}{2}$ fathoms on the western side of Svegliegamora Point.

Islets and rocks.—Eastward of Lagosta Island are two groups of islets, rocks, and shoals; the western group, lying within a radius of about $3\frac{1}{2}$ miles of Norikum Point, the eastern point of Lagosta, consists of four principal and ten smaller islets or rocks, ranging in height from a little above water to 272 feet, the larger islets being covered with bushes.

Markienda Rock (lat. $42^{\circ} 47' N.$, long. $17^{\circ} 00' E.$), 6 feet high, is situated on the reef of the same name; this reef extends 800 yards northwestward of the rock, is 0.7 mile in length northwest and southeast, with $1\frac{1}{2}$ to 3 fathoms water on it, and is steep-to. The Markiendra Rock is distant nearly 1 mile about north-northeast from the eastern point of Mladine Islet.

The Tajan, the two northernmost islets, extend over a space of about 800 yards; the larger islet is 49 feet high and lies 342° , $1\frac{1}{2}$ miles from Markiendra Rock.

Markienda (Mrkenta) Biela Rock is small, round, and 10 feet high; it lies 1,700 yards eastward of Mladine Islet and the same distance southward of Markiendra Rock. The islets and rocks just described are the easternmost of the western group.

Between these and Lagosta are the larger islets Mladine, Cesvenica, Krusica, and Stromorin, with many rocks and shoals, and deep water around and between them. In taking the channel between them and the eastern end of Lagosta, great caution is required and the chart is the best guide.

Lagostini Islets.—The Lagostini or Eastern Group, consisting of nine small islets or rocks, extend east and west $3\frac{1}{2}$ miles, and form a line of breakers. As the currents in the vicinity of all these islets may be strong or irregular, and as the water is deep and the dangers steep-to, it is advisable to give them a wide berth. They are all more or less frequented by fishermen.

Sestrice Islets (lat. $42^{\circ} 45' N.$, long. $17^{\circ} 05' E.$)—The three western islets of the Lagostini Group are the Sestrice, of which the largest is 52 feet high; about $\frac{1}{4}$ mile westward of the Sestrice is Ankovica Shoal, with 4 fathoms water. Between these islets and the Markiendra Biela Rock, northwestward of them, the channel is $2\frac{1}{2}$ miles wide, and with the exception of the 4-fathom shoal, clear and deep, but the current through is irregular and at times rapid; vessels from the southward prefer passing between the eastern end of the group and Meleda Island.

Glavat, the eastern islet of the Lagostini Group, on which stands a lighthouse, is small and round, 72 feet high, and steep-to except on the western side; from it the western extremity of Meleda Island lies easterly, distant $7\frac{1}{4}$ miles.

Light.—From a stone octagonal tower above dwelling, 84 feet high, on the summit of Glavat Islet, at an elevation of 150 feet above the sea, is exhibited a fixed and flashing light with a period of 2 minutes. The light is obscured over Lagostini Rocks, between 70° and 120° . In clear weather the white light is visible from a distance of 16 miles, red flashes at 13 miles. (See Light List.)

Lagosta and Meleda Channels.—These channels are continuations of each other; the former is between Lagosta Island and the Lagostini Islets and rocks on the south and Curzola Island on the north; the latter is between the Sabbioncello Peninsula and Meleda Island. The general depths are from 30 to 50 fathoms.

In the Lagosta Channel the only dangers (night only) are the Tajan Islets, 49 feet high, just described; the ordinary westerly current sets through it, and when accelerated by easterly winds troublesome eddies are caused at the western entrance. With a southerly wind, the Curzola shore would be approached in order to be in a position to seek, if necessary, one of the anchorages at its western end; but as there are no anchorages in the eastern part of the channel, caution is necessary in sailing vessels to guard against a sudden fall of wind, which may be accompanied by an increasing sea.

In the winter season the bora blows heavily in this channel, and it is prudent to endeavor to reach Port Rosso or some other shelter at the first symptoms of its approach, in order to avoid the necessity of bearing up for Manfredonia or of lying-to under the lee of the island. In the Meleda Channel the ordinary westerly set of current occurs, except in the winter season during the easterly winds, when the direction is generally about west-northwest. Southerly and southeasterly winds raise a heavy sea, especially on the Sabbioncello coast, which should be avoided, as these winds seldom blow home. With the Bora a vessel should keep near this side, but at a safe distance.

Meleda Channel, north shore.—The coast from Giuliana Bay to the southeast extremity of the Sabbioncello Peninsula forms the northern side of Meleda Channel; it is high and of whitish aspect, with scattered patches of brushwood. With the exception of a $1\frac{1}{2}$ -fathom shoal about 350 yards from the shore and 800 yards southeastward of Alessandra Islet, the water is everywhere deep and the shore bold. It is almost uninhabited, without any good anchorage, and subject to sudden northeasterly squalls, especially toward the close of day; it is therefore advisable to keep as close to the shore as possible.

Small vessels occasionally anchor at Port Prapatna, about 12 miles southeastward of Giuliana Bay, where they secure to the shore. There is no village in the immediate neighborhood, but a path leads from this little port to the town of Stagno, $1\frac{1}{2}$ miles northeastward of it. The whole of this coast is backed by high land, the mountains rising immediately over it.

Telegraph cable.—From the eastern shore of Port Prapatna, a telegraph cable is laid to a position 500 yards westward of Pusta Point, Port Mezzo Meleda.

South shore—Meleda Island, ancient Melita, is the southeasternmost of the larger islands of Dalmatia. It is $20\frac{1}{2}$ miles in length, with an extreme width of about 2 miles, and consists of a series of wooded hills with a deep depression at about one-third from its eastern extremity, and appears, when seen from the northward, like two groups of islets. Its highest part, Mount Velki Grad, 1,686 feet above the sea, is near the center; the northern side of the island is wooded and well cultivated; the opposite side is a rocky sterile country, except toward the western extremity where there is an extensive pine forest.

There are about 1,600 inhabitants whose principal occupations are agriculture and fishing. There are six small towns or villages, of which the chief is on the southern slope of Mount Velki Grad.

The southern coast is rocky, barren, and without any anchorage, and should not be closely approached. The northern coast, in Meleda Channel, is easy of access and has one or two anchorages.

Port Palma (lat. $42^{\circ} 48' N.$, long. $17^{\circ} 20' E.$), at the western end of Meleda, is sheltered by an irregular forked projection terminating in Goli Rat Point, the western extremity of the island; and, trending northward, it forms with the coast eastward of it, Port Palma affording anchorage for small vessels. The inlet is about 1,400 yards in length, from 235 to 500 yards in breadth, and is sheltered northward and northeastward by Galica and Pomestak Islets, the latter 148 feet high, whitish at the base, and covered with brushwood to the summit.

Vessels anchor southward of Pomestak Islet in depths of 16 to 21 fathoms and make fast to it; and, farther down the inlet on the south, in about 12 fathoms, sand and mud. The entrance is between the northeastern coast of Goli Rat Point which forms a fork, on the starboard hand, and the two small grayish-colored islets Cerna Seka and Galica, together with Pomestak Islets, on the port hand.

The land of Goli Rat Point is a high irregular strip and is a good mark. Cerna Seka, the outer islet in front of the entrance, is shoal all around, and should not be approached too closely. Silj, a small islet immediately northward of Goli Rat Point and about 200 yards from the shore, is also foul.

From Goli Rat Point, the northern coast of Meleda eastward to Port Palazzo, a distance of about $3\frac{1}{2}$ miles, is irregular, with several islets and sunken rocks, the latter being near the shore and mostly within Glavat, the northern or outer islet, which is steep-to. At 235 yards off the eastern head of Stupe Bay and more than $\frac{1}{4}$ mile from Stupe Point, the western point of entrance to Port Palazzo, is a sunken rock on which the sea breaks.

Port Palazzo is a bay on the northern side and near the western end of Meleda, formed by Stupe and Krizine Points, about 2 miles apart, the entrance of the bay being occupied by the four rocky islets, Kobravac, Ovrat, Moracnik, and Tainic. Between the islets and the points are four entrances to the bay, all of which are deep and clear of dangers except that westward of Moracnik, and in which, as well as in the bay itself, are several good anchorages. The port is westward of the islets, and the most sheltered position is abreast the ruins of a palace, from whence it is said to derive its name; it has depths of 7 to 12 fathoms, mud; vessels also anchor between the islets and the shore eastward of the narrowest part of the port in 19 or 20 fathoms water. Rogac Cove at the head of the bay is almost landlocked.

The islet of Kobravac is the largest of those fronting Palazzo Bay; it is nearly 1.3 miles in length, of little breadth, lies parallel with the shore of Meleda, and protects a narrow channel from 150 yards to 400 yards in width; the other three islets are smaller and lie northward and westward of it. These islets range from 105 to 331 feet in height.

The bay from Tainic, the inner islet, is about 1 mile deep, the narrowest part being contracted to less than 300 yards in width, with a landlocked basin at its head having a depth of 6 to 7 fathoms; in the southwestern corner the shore is bordered by shallow rocky ground, which extends more than 200 yards offshore.

Temporary anchorage.—The anchorage most frequented for temporary purposes is that between Kobravac Islet and the shore of Meleda in from 17 to 23 fathoms, sand and mud; a better berth is farther westward between the western end of Kobravac and Tainic

Islet. The Kula rock, above water, lies in the middle of the eastern entrance to the channel between Kobravac Islet and Krizine Point. Palazzo is considered one of the best ports of the Dalmatian Islands, but its space is rather limited and the islets at the entrance render access somewhat difficult in a vessel under sail, but, according to the wind, one or more channels would be always available.

Directions.—In making for Port Palazzo, Goli rat Point will be readily recognized; the land is thickly wooded, and the four rocky islets described present a barren whitish aspect. In southerly winds a vessel should be prepared for sudden heavy squalls in the narrow passages between the islets. In taking the western pass between Stupe Point (which has shoal ground extending 60 yards eastward) and Moracnik Islet, the northwestern shore should be closed in order to clear the rocks awash near Moracnik; but vessels of deep draft should avoid this passage, as shoal water extends into it both from the southern end of Moracnik and from the point opposite, contracting the deep water to very narrow limits. Small vessels should here keep in mid-channel.

In the other passages, a mid-channel course should be followed, the points of the islets being foul, especially Moracnik and Ovrat.

Port Mezzo Meleda (lat. 42° 44' N., long. 17° 36' E.), is about 8½ miles eastward from the eastern entrance to Palazzo; the intervening coast is straight with deep water close-to, and affords no shelter. The entrance is between Pusta Point on the northwest and Badanj Islet on the southeast, about 1,000 yards apart. The port consists of two bays and is a convenient anchorage for wind-bound vessels if a berth be chosen with reference to getting under way with a fair wind. The anchorage for vessels of deep draft is in 35 fathoms, sand, in the westernmost of the bays. The northern shore where the depth is from 16 to 27 fathoms, sand, should be preferred, being the best sheltered from winds from this quarter. A point in the southwestern side of the bay is bordered by rocks, and another rock lies near the northern shore in the inner part. About 600 yards westward from Badanj Islet is a rocky bank with 6 fathoms water which should be avoided when taking up a berth between the two bays. The shores are backed by well-wooded hills.

Lights.—On Pusta Point is shown, from a red iron post, 30 feet high, at an elevation of 43 feet above the sea, a fixed white light visible 7 miles when bearing from 156° to 43°.

An occulting red light is shown from an iron column 13 feet high, 28 feet above the sea level and visible 4 miles.

Telegraph.—A submarine cable connects Meleda with the mainland. It is laid between the eastern side of Port Prapatna and the valley westward of Pusta Point, entrance to Port Mezzo Meleda.

Directions.—The position of Port Mezzo Meleda is easily distinguished, being at the depression of the land. In entering between Pusta Point on the starboard hand and Badanj Islet on the port hand, the former should not be too closely approached, as a shoal with the Supenak Rock, awash, extends nearly 100 yards northeastward. To clear the rock at night, the light should be kept 100 yards distance until it bears westward of 249° .

Coast.—From Mezzo Meleda to Gruj Point, the eastern extremity of Meleda, the coast is irregular, with deep water, and one or two small islets or rocks close to. At $1\frac{1}{2}$ miles eastward of Mezzo Meleda is Port Chiave, a small bay or cove with 10 fathoms water, partially protected on the north by three islets, of which Borovac, the most northern, has a sunken rock off its northwestern end. About $\frac{3}{4}$ mile beyond Borovac Islet, off the eastern side of Maharci Point, is a shoal with $2\frac{1}{2}$ fathoms water. About $\frac{3}{4}$ mile southeastward of this is the small port of Camera, and, at the northern extremity of the eastern end of Meleda, is Port Cima di Meleda, between Cima Islet and the shore.

These ports are only adapted for the smallest coasters.

Gruj Point (lat. $42^{\circ} 41' N.$, long. $17^{\circ} 45' E.$), the eastern extremity of Meleda, $4\frac{1}{2}$ miles farther on, is the termination of a peninsula 491 feet high, and has a bay or cove on either side. About 350 yards from the southeastern face of the point is a shoal covered by 4 fathoms water, and with a depth of 17 fathoms between it and the shore.

Between the eastern end of Meleda on the south and Giuppana and Jaklian Islands on the east and north is the eastern entrance of the Meleda Channel, about 3 miles wide, which is seldom entered except by coasting vessels on their way to the Sabbioncello Channel.

South coast.—Along the southern coast of Meleda, the water is deep and there is no shelter whatever, the whole coast being exposed to southwesterly winds and sea. Temporary anchorage in fine weather may be found in Sablonava Cove on the western side of the Gruj Peninsula and, for a small vessel, at Port Inganatore (lat. $42^{\circ} 46' N.$, long. $17^{\circ} 24' E.$) near the entrance to the Lago Grande and about 4 miles from the western end of the island. A small islet or rock here and there lies off the coast, but scarcely beyond the distance of $\frac{1}{2}$ mile; as, however, there is nothing to be gained by nearing this coast it is better to give it a wide berth.

The Calamota Channel, commencing at the southern extremity of the Sabbioncello Peninsula, is the in-shore channel between the coast of Dalmatia and several small islands and islets extending parallel with the coast as far as Port Malfi. It is about 12 miles in length and from 1,400 yards to 1 mile in width with central depths

of 25 to 35 fathoms. The channel is easy to enter at all seasons, and its shores afford some of the best and most important anchorages in the Adriatic. The holding ground is good almost throughout.

The main entrance is the Bocca Grande, at the southeast end of the islands forming the channel.

Islands on south side—Olipa Island—Bocca Inganatore.—Between Olipa, the northwestern island of this chain, and Nosize Point, the southeastern extremity of the Sabbioncello Peninsula, is the Bocca Inganatore, an entrance leading to the Calamotta and Stagno channels. It is too narrow to be considered easy even with a commanding breeze, though the steep, rocky shore is of bold approach. The summit of Olipa, 692 feet high, is covered with bushes. Nosize Point is uncultivated and overgrown with impenetrable brushwood.

Port Ladro is on the northwestern side of Olipa; here a vessel of deep draft may moor sheltered from all winds.

Light.—On the south end of Olipa Island is a white quadrangular stone tower, 300 yards southwestward of the keeper's dwelling, from which is exhibited at an elevation of 103 feet above the sea, a fixed red light, visible 9 miles, when bearing between 253° and 104° .

Bocca Falsa—Jaklian Island is $2\frac{1}{4}$ miles in length, and lies southeastward of Olipa; between them is the Bocca Falsa, the second narrow passage from the northward leading into the Calamota Channel. The passage is contracted to about $\frac{1}{4}$ mile in width by rocks awash off Seka Point, the northwestern extremity of the island.

Four small islets lie off the northeastern shore of Jaklian, forming with it good anchorages for small vessels. Of these anchorages the first, or northwestern, is in a depth of 18 fathoms, gravel and shells, southeastward of Tajan Islet which is covered with brushwood; the second is southwestward of Cerkvina Islet, in 15 fathoms, mud; the third, with Kosmec Islet, 85 feet high, bearing about 252° or 116° , either position being well protected from the Bora.

The Bocca Falsa should not be attempted in sailing vessels with southeasterly winds or with the Bora; calms, and eddy currents setting toward the shore, are of constant occurrence. It is occasionally used in northwesterly winds, and, if so, after passing Olipa, the vessel should be kept close hauled until beyond Tajan Islet and certain of weathering Misnjak Islet, as the wind often heads as Maestro Bay opens out.

Jaklian Island is easily identified; its center is 38 feet above the sea and is a blanched stony peak; the southern shore is rocky and precipitous; the northern side is covered with brushwood interspersed with cultivated patches, and there are a few houses on its eastern extremity.

Giuppana Island lies southeastward of Jaklian and is separated from it by Pompejana Strait, the third channel from the northward into the Calamota Channel. The northwestern part of Giuppana overlaps Jaklian within it, and a projecting point from the former forms this narrow tortuous strait which is but seldom used. If a vessel should be forced to attempt this passage, the Giuppana shore should be kept close aboard so as to avoid the rocks in the southwestern angle of the pass, and to be enabled to anchor if necessary; the inner part of Giuppana Point, forming the pass, is foul.

Giuppana is $4\frac{1}{2}$ miles in length, and nearly $1\frac{1}{2}$ miles in breadth; its northern part is 794 feet in height; it is the largest and most thickly peopled of this group of islands. It may be recognized by the cone-shaped Mount St. Ullia (lat. $42^{\circ} 43' N.$, long. $17^{\circ} 53' E.$), 732 feet high, about one-third from its southeastern end; the shores are rocky and bold; near the coast is a series of rocky wooded hills with fertile valleys; farther inland is a rich plain, on which are grown the vine, olive, and all kinds of fruit.

Luka Cove.—The northwestern coast of Giuppana forms with that of Jaklian Island a long bay protected on all sides; the bottom throughout is hard mud, and vessels may safely anchor in any part, near enough to the shore to lay out cables to it. Luka Cove, at the head of the bay, has sufficient space for several vessels, and it would be preferable to all the other Calamota anchorages were it not so far from the mainland and so difficult of access in southwesterly winds.

Luka Village is close to the shore at the head of the cove.

Light.—A fixed red light, elevated 18 feet above the sea is exhibited from an iron standard on the landing pier in Luka Cove, visible 3 miles.

Telegraph.—There is a submarine telegraph cable across the Calamota Channel from a small bay at the north end of Giuppana Island, south of Misnjak Island, to the mainland northeastward.

The landing places of the cable are marked by small stone buildings, 10 feet high. There is a telegraph station at Luka.

Vessels are prohibited from anchoring in the vicinity of the cable.

Mezzo Island and Strait (lat. $42^{\circ} 41' N.$, long. $17^{\circ} 57' E.$).—Mezzo Island lies southeastward of Giuppana, and is separated from it by Mezzo Strait, which is the fourth channel from the northward and one of the best into the Calamota Channel, especially in northwesterly winds.

The island is nearly $2\frac{1}{2}$ miles in length, 700 feet high, and has a bay both on its northwestern and southeastern sides; its southwestern and northeastern sides are rocky and bordered at a short distance by reefs. It contains about 700 inhabitants, chiefly mariners; the soil is fertile, the vine and olive flourish, and several flocks of sheep find pasture.

Rudda Islet (265 feet high), which lies in the inner part of Mezzo Strait, reduces the width of the channel to about 1,400 yards and makes it somewhat impracticable to beat through with southeasterly or northerly winds, or in any other than fine weather.

Shallow water with a small rock extends $\frac{1}{4}$ mile northwestward of Rudda, and the Marnic, another rock, lies close off the northern extremity of Mezzo.

A vessel in Mezzo Strait unable to weather Rudda should not attempt to pass between it and Giuppana on account of the shoal extending northwestward of the islet, which would necessitate too close an approach to Giuppana, but should rather anchor under the lee of Mezzo in a depth of about 22 fathoms.

Anchorage.—Mezzo Strait affords good anchorage for vessels prevented by calms or contrary winds from proceeding through the Calamota Channel, both in San Giorgio Cove, Giuppana, westward of Rudda Islet, where vessels anchor abreast the village in depths of 8 to 11 fathoms, excellent holding ground; and, in Mezzo Road, a small bay at the head of which is the village of Mezzo. The road is sheltered from easterly and southeasterly winds, but those from the westward send in a considerable sea; the best berth is in the middle of the bay in 11 to 18 fathoms, mud and sand.

In the small bay on the southeastern side of Mezzo Island, westward of Palughe Point, there is good shelter from northerly and westerly winds, but a heavy sea is sent in by those from southeastward. The best berth is near the middle of the bay in 4 to 9 fathoms, sand. When approaching from the southward a berth must be given to the rocks at the southern point of the bay.

About 600 yards southeastward of the point is the small islet of Skupielli, 50 feet high, with a 3-fathom shoal off its eastern side.

Calamota Island and Strait.—Calamota is the easternmost of the islands, and is divided from Mezzo Island by Calamota Strait, leading into Calamota Channel; being very short, it is easily taken even with a scant wind. Near the fairway, off Cavalika Point, is Cavalika Shoal, with about 1 fathom water, marked on its northwestern side by a nun buoy surmounted by a staff and white ball; the best channel is between the buoy and Mezzo, but there is a depth of 8 fathoms between the shoal and Calamota.

Calamota Island is smaller than Mezzo; the western portion is 410 feet high, and covered with pine trees; on the remainder are grown the fig and olive. It contains about 400 inhabitants.

The southwestern coast of Calamota is rocky and thickly overgrown with bushes; it forms a bend in which refuge may be taken from a bora, in depths of from 12 to 18 fathoms, at from 300 to 600 yards from the shore; both inside and outside this distance the bottom is rocky. There is also anchorage near the middle of the small bay

at the northern extremity of Calamota Island, but vessels should not proceed too far in. Northwesterly winds only are much felt here; the holding ground is good.

St. Andrea, a high barren rock with a convent on it, and precipitous on its southwestern side, lies in the southern approach to Calamota Strait, at rather more than $1\frac{1}{2}$ miles southward of Mezzo Island, and serves to point out the passage.

Light.—On the northwestern or highest part of St. Andrea (or Donzella) Islet is a stone lighthouse 56 feet high from which is exhibited at an elevation of 226 feet above the sea an alternating fixed and flashing light. (See Light List.)

Bocca Grande, between Calamota Island and the Pettini Islands, or rocks, is the southeasternmost passage into the Calamota Channel; it is also the largest and most frequented, especially by vessels from the southward, being $1\frac{1}{4}$ miles wide and clear of danger. The water close to the Pettini Rocks is deep, but, as the current is strong, they should not be too closely approached.

This passage may be easily recognized by day by Mount Petka, a double hill 648 feet high, covered with fir trees and with high reddish-brown cliffs on its sea face, and terminating westward in Petka Point, off which are the Pettini Rocks, a line of small abrupt islets of reddish color; and, at night, by St. Andrea, Pettini, and Ragusa Lights.

There is also a narrow pass between the shore and the Pettini Rocks, sometimes convenient for small craft with local knowledge, in order to keep to windward in northeasterly winds. In the middle of it there is a rock which shows at low water and which should be left to the eastward.

Light.—On the summit of the outer Pettini Rock is exhibited, at an elevation of 88 feet above the sea, a fixed white light, visible 11 miles.

Great Stagno Channel is an inlet in the Sabbioncello Peninsula and a continuation for 5 miles northwestward of the Calamota Channel; it is $\frac{3}{4}$ mile wide at the entrance and narrows toward the head, where are the town and fort of Stagno, from whence the distance across the peninsula to Stagno Piccolo is only about 0.7 mile.

It affords good anchorage under its northern shore for $3\frac{1}{4}$ miles up, where there is a depth of 10 fathoms; thence it carries from $2\frac{1}{2}$ fathoms to $\frac{1}{2}$ fathom at its head. It is not, however, often visited, being rendered very unhealthy, especially in summer, by northwesterly winds, which traverse extensive salt marshes; it might, however, be a convenient temporary refuge for a vessel obliged to enter the channel by the Bocca Falsa, if unable to reach Maestro Bay. small craft moor abreast of Kabas Village, larger vessels anchor northward of it.

The rise and fall of the tide is from 1 to $1\frac{1}{2}$ feet; at low water the mud banks at the head of the inlet emit noxious exhalations. At the town or village of Stagno small supplies of water and provisions may probably be obtained.

Lights.—At Broce, on the southwestern side, about 1.3 miles from the head of the channel, a small fixed red light is exhibited from the head of the mole, visible 3 miles; it can not be lighted during southeasterly gales.

At Stagno Molehead a small fixed green light is shown, visible about 2 miles.

The alignment of piling on the west side of Great Stagno Channel is indicated by a white light 660 yards west-northwest from Broce and a red light 770 yards northwest from the white one. (See Light List.)

Maestro Bay (lat. $42^{\circ} 47' N.$, long. $17^{\circ} 50' E.$) is the largest and best anchorage in the Calamota Channel. The northern shore between Budina Cove and Port Slano should be preferred, and it is customary, in anticipation of a bora, for small vessels to lay out cables to it. The depth near the middle of the bay is about 32 fathoms, greenish mud, and from 11 to 22 fathoms, sand and mud, at a short distance along the shore.

In calms or contrary winds the coast between Budina Cove and Doli Bay to the westward should not be approached in a sailing vessel, as submarine springs occasion considerable eddies. Budina and Janska coves and Doli Bay afford good shelter to coasting vessels.

Water.—There is an excellent watering place on the mainland about 1 mile southward of Maestro Bay; it is in the little shingly bay of Sladienovic and may be known by the small church of San Giovanni close to the beach.

Port Slano is nearly landlocked; the entrance is 270 yards wide between Dolnja and Gornja Points on the mainland opposite the northern end of Giuppana Island. It is 1 mile in length, from 500 to 800 yards in width, with a depth of 8 to 18 fathoms, better protected from the bora than any other of the Calamota anchorages, and sheltered from southeasterly winds, during which it can be entered without any difficulty. The land breeze, which generally blows at night, facilitates departure. The holding ground is mud and is generally good.

Osmine Bay, on the port hand within the entrance, should be avoided, as the bottom is rocky.

Port Slano is so situated with regard to the two southern passages to Calamota Channel that it may be entered from thence in the heaviest southeasterly winds.

Dolnja Point, on the northwestern side of entrance, is bordered by a rocky shoal to the distance of about 100 yards, and a similar shoal surrounds Gornja Point, opposite. There is anchorage outside near

Gornja Point in deep water, the sea sent into the channel by sirocco winds being but slightly felt here.

Light.—From a mast at the south corner of the keeper's dwelling at Dolnja Point, on the northwestern side of entrance to Port Slano, a fixed white light is exhibited at an elevation of 46 feet above the sea, visible 5 miles, when bearing from 220° to 90° .

Buoy.—Off the village, at the northeastern end of the port, there is an iron mooring buoy in a depth of $7\frac{1}{2}$ fathoms.

Slano Village.—**Water** in abundance may be procured from a stream on the eastern shore not far from Slano Village, which is near the head of the port and communicates by a good road with Ragusa.

Anchorage.—There is anchorage off the valley of Slano at the head of the port in about 6 fathoms and in about 12 fathoms halfway between it and the entrance.

Telegraph.—There is a telegraph station at Slano.

Temporary anchorage in Calamota Channel.—One of the best anchorages in the Calamota Channel is between Calamota Island and the mainland. Large vessels seeking shelter from a southeasterly gale generally anchor in a depth of about 15 fathoms, sand and hard mud, with St. Andrea Islet on with Cavalika Point, the western extremity of Calamota Island; here the swell from outside is felt, but southeasterly winds seldom last long enough to raise a heavy sea. This anchorage may be easily reached in southeasterly winds and can be quitted without difficulty with any wind.

Vessels never anchor in mid-channel when anticipating bad weather, but on entering from the southward proceed to Port Malfi or, if prevented by stress of weather, to the anchorage in Calamota Bay, on the northwestern side of the island.

Port Malfi (lat. $42^{\circ} 41' N.$, long. $18^{\circ} 03' E.$) is an inlet about 1 mile in length and an average breadth of 400 yards, with depths of from 13 to 9 fathoms. Southwesterly winds raise a considerable sea, the entrance lying immediately opposite the Bocca Grande; the only good shelter is in the coves on the western shore. The best anchorage is in Soline Cove, with cables to the shore against the bora, which here blows violently. Veliki-Zaton Cove is fit for small vessels only. Abreast of Malfi, on the western side of the port, is a shoal with $2\frac{1}{2}$ fathoms water.

Malfi is preferred by sailing craft to Gravosa and Ombla, being of easy entrance in southeasterly winds and easily quitted in those from the opposite quarter. The shores are exceedingly picturesque, particularly at Mali-Zaton Bay at the foot of a hill the base of which is covered with vines and olive trees amid numerous dwellings.

Water.—Vessels formerly frequently visited this port to procure water on the northern shore from a stream on which are several mills.

Daksa Islet.—When entering Calamota Channel by the Bocca Grande, the entrance to Malfi, immediately opposite, will be readily recognized, as also Daksa Islet to the eastward in the fairway of the channel leading to Ombla and Gravosa. On Daksa is a battery, a convent, and a lighthouse.

Lights.—On the north end of Daksa Islet, 40 yards within its extremity, a fixed red light is exhibited from an octagonal stone tower on keeper's dwelling 41 feet high, at an elevation of 65 feet above the sea, visible 10 miles. The light is obscured when bearing from 312° to 358° .

About $4\frac{1}{2}$ miles northwestward of Daksa Islet Light and on the north shore of Calamota Channel at Cannosa a fixed red light is exhibited, visible 5 miles. (See Light List.)

Ombla Inlet.—Sailing craft occasionally anchor close to the winding northern shore of this long narrow inlet to avoid the bora which sometimes blows violently in the direction of its length. Southerly and southwesterly winds send in a swell but do not last long and are never very inconvenient. The depths are from 17 fathoms at the entrance to 7 and 4 fathoms near the head. Both shores are covered with houses amid gardens and cultivated ground.

Owing to its narrowness and length, about 2 miles, the inlet is not easily reached in a vessel under sail without a favorable wind, especially in the winter, when the outgoing current is strong. In the event of the wind failing at the entrance, it is advisable for a sailing vessel to come to in the vicinity of Daksa Islet and to warp or tow to the anchorage if not convenient to wait for a breeze.

Between Malfi and Ombla the coast affords excellent shelter in a depth of 18 to 20 fathoms, green mud and sand. This shore is sterile and has few inhabitants; westward of Malfi it is covered with habitations and well cultivated. This eastern anchorage and also Port Malfi are convenient for vessels bound to, but unable to enter, Gravosa during southeasterly winds.

Water.—A stream of excellent water empties itself at the head of Ombla Inlet. Some craft of 8 feet draft may ascend to the source about $\frac{3}{4}$ mile beyond, where the water rushes out in a clear stream from the mountain side.

Telegraph cables.—Five telegraph cables cross the entrance of Ombla Inlet, starting from a position 200 yards eastward of Cantafico Point on the southern shore to a position about 550 yards eastward of Leandra Point on the northern shore. Both ends are marked by beacons or small turrets and no vessel should anchor within at least 100 yards of this vicinity.

Port Gravosa, on the southern side of the entrance to Ombla Inlet, from which it is separated by Cantafico Point, lies between that point and the Lapad Peninsula; it has not much anchorage space for

large vessels within the port, the shores and head of the harbor being bordered by banks of mud with 3 and 2 fathoms water on them. There is, however, a narrow channel, decreasing from 15 to 6 fathoms, about $\frac{1}{2}$ mile in length; in the fairway, southwestward of Cantafico Point Light, the bottom is rocky, with a depth of 15 fathoms; this portion should be avoided when seeking anchorage.

It is a snug harbor, and, including the space within Daksa Island in the approach, will contain some 40 or 50 vessels. It has frequently been the rendezvous of squadrons of men-of-war.

Vessels wintering here moor in the middle of the harbor and secure to the northeastern shore, being there greatly protected from bora squalls, which blow violently over the high hills; heavy gusts are also felt with sirocco winds, but the water is always smooth.

In the vicinity of its shores, as with Ombla Inlet, are numerous villages surrounded by cultivated grounds.

Anchorage.—A berth will be found in the outer part of the harbor with the anchors in a depth of 11 fathoms, mud, and the stern secured in $3\frac{1}{2}$ fathoms to the northeastern shore, where there are mooring bollards at convenient distances. Except on this shore the holding ground is indifferent, being soft mud, and as large vessels visiting the port must lie in mid-channel, they are liable to drag their anchors, unless properly moored.

Buoys and beacons.—A rock with $2\frac{1}{2}$ fathoms of water lies off the eastern shore, about 270 yards northwestward of the coal stores; it is marked by a white pyramid beacon buoy; there is a depth of $3\frac{1}{2}$ fathoms inside this rock, and from 6 to 9 fathoms on its western side, but the bottom is foul. Sipak Rock, with $2\frac{3}{4}$ fathoms, lies about 200 yards 274° from it, on the opposite side of the channel and is unmarked.

There are two mooring buoys in the port for the convenience of small steamers.

A rocky bank extends some little distance off the northern front of the Lapad Peninsula; its position is indicated by a white stone truncated pyramid 10 feet high. The shore westward of this is bordered by a rocky shoal overlaid by mud.

Lights.—There is a fixed red light at the head of the new mole and two fixed green lights (vertical) near Cantafico Point. (See Light List.)

Coal and supplies.—About 2,000 tons of Welsh coal are kept in stock at Gravosa, for the use of the Government and the Austrian Lloyd's Co.; foreign vessels are only supplied with this in cases of necessity. There is usually about 600 tons of Bosnian coal in private hands. Vessels coal alongside a pontoon connected with the shore at the coal stores, about 1,400 yards northward of the Santa Croce

Mole. Water and provisions of all kinds may be procured, fresh provisions being plentiful.

Lifeboat.—There is a lifeboat stationed at Port Gravosa.

Directions—Calamota Channel.—Mount Timor, which rises to the height of 2,954 feet above the sea, over Maestro Bay, is the commencement of the high land which extends parallel with this part of the Dalmatian coast. The mount is a good mark for approaching the various passages to the Calamota Channel from the westward; it opens well out on the left from the chain of mountains in the interior, and its bare rounded summit overtopping the surrounding land may be seen at a great distance. Mezzo, and then the other islands, will subsequently appear, and the choice of passage may then be determined according to the circumstances of wind and weather.

When approaching from the eastward, the high land near Ragusa should be steered for as soon as visible, in order to profit by the westerly current along the coast. In southeasterly winds, vessels should beware of heavy squalls over Lapad Bay and out of Ombla Inlet, which draw more eastward than the regular breeze. The coast between the Pettini Rocks and Ragusa is bold and covered with bushes.

In proceeding to Ombla or to Gravosa, Daksa Islet may be passed on either side. In passing southward of it, and between it and the two hillocks crowned by a battery, the Daksa side of the channel should be preferred on account of the shallow bank bordering the opposite coast. Between the batteries near Lapad Point and the entrance to Gravosa, also, the shore should be avoided, as it is bordered by rocks. Gujiliste Bank, about 50 yards in extent, with 5 fathoms water and 7 to 14 fathoms around, lies about 200 yards northwestward of Lapad Point.

Entering Gravosa, the fairway should be kept, passing within 100 yards of the buoy marking the rock on the eastern side of the port, anchoring as before directed.

Lapad (or San Martino) Bay, between Lapad Point and Pettini Rocks, is resorted to by small craft for protection against bora and sirocco gales. The anchorage is in a depth of 12 to 14 fathoms. Both Petka and Lapad Points are high and covered with trees.

Ragusa.—The town of Ragusa is prettily situated, surrounded by a fortified wall, the greater part of which is washed by the sea and commanded by Fort Imperial, on a hill 1,350 feet high. The environs are well cultivated and have numerous handsome dwellings. Ragusa was formerly a rich republic of 40,000 inhabitants and, like Venice, traded to all parts of the world; it has now dwindled to about 10,000, of whom a large number are mariners, who carry on a considerable commerce in arms, salt, rice, etc., which are exchanged for grain, wood, and cattle brought from Herzegovina.

Port Cassone, a cove on the eastern side of the town, has space for a few small vessels in about 2 fathoms water. Southeasterly winds cause a heavy sea at the opening into the port, which is between two small moles, rendering entrance difficult and at times impracticable.

Lights—Port Cassone.—A fixed red light is shown from the extremity of the new dike, and a fixed white light with red sector is exhibited at the head of the landing mole. (See Light List.)

Coal.—About 4,000 tons, Welsh, the property of the Austrian Government, and from 800 to 1,000 tons of coal belonging to private firms, is kept here. There is a coal wharf 330 feet in length with a depth of 10 feet alongside.

Water may be procured from an aqueduct near the lazaretto, at a short distance eastward from the town.

Railroad.—There is a railroad from Ragusa to Castelnovo, Topla Bay, Cattaro Gulf.

Telegraph.—Ragusa is a telegraph station.

Lacroma Island, in the approach to the port, is rocky, steep-to, and nearly 1 mile in length north and south; it is from 180 to 298 feet high, and when seen from the southwestward appears to be divided into two at the middle; Fort Royal stands on its northern part.

The roadstead is between the town of Ragusa and Lacroma Island, and has depths of 8 to 15 fathoms. It is exposed to a heavy sea during southeasterly winds, at the first sign of which it is the custom for vessels to weigh and proceed to Calamota Channel; or, if obliged to remain, to haul close under the northern shore of the island and make fast to stone bollards provided for the purpose. In this position they often ride out heavy weather, but this anchorage should be resorted to in the summer season only, and it is almost the only one on the coast of Dalmatia where vessels moor to the shore against southeasterly winds.

There is a mooring buoy in the road, fit for a heavy vessel.

Landmarks—Directions.—Mount Snieznica is a good guide in making Ragusa or any port on this part of the coast; it is about 12 miles eastward of Ragusa, 4 miles inland, and 4,050 feet above the sea. It has a bare summit and may be easily recognized, being one of the highest mountains on this part of the coast, and between it and the mountains bordering the Gulf of Cattaro the land is comparatively low. On a nearer approach Fort Imperial, which is visible at a great distance, indicates the position of the town and anchorage.

Breno Bay.—Between Ragusa and Pellegrino Point, a distance of 3.3 miles, is a barren rocky coast with deep water close in shore. Immediately eastward of Pellegrino Point is Breno Bay, with good

anchorage in its eastern part for vessels of any draft either in bora or southeasterly gales; the depth is from 15 to 20 fathoms, and the bottom is greenish mud mixed with shells and gravel, or with seaweed. A heavy sea is raised by southwesterly and northwesterly winds when it is necessary to avoid anchoring close to the shore.

There is a mooring buoy off Kupari Village.

In these winds small craft generally resort to Port Tiha, the little indentation in the southern part of the bay on the eastern side of the town of Ragusa Vecchia, where they secure to the shore, the anchor otherwise not holding in the weedy bottom.

The Breno Valley to the northward of the bay is a plain surrounded by high land and is rather extensive; being well sheltered, it is thickly planted with vines and olive trees. Water is obtained from a river running through the valley and flowing into the sea close to the village of Kupari. The water of the Gliuta Rivulet, in the eastern part of the bay, is not drinkable.

Directions.—Mount Strazistje, 2,320 feet high and about $1\frac{1}{2}$ miles eastward of the anchorage, is a good distant mark for vessels making for Breno Bay, but it is advisable to make the land well to the eastward on account of the westerly current. Large vessels should take the clear passage northward of Bobara and St. Pietro Islets. There is a passage between St. Pietro and St. Rocco Point, but the Superka Rock and bank nearly midway must be carefully avoided.

Ragusa Vecchia approach.—**Merkan and Bobara Islets**, with six or seven large rocks, lie off the southwestern side of Breno Bay and extend nearly $1\frac{1}{2}$ miles northwest and southeast, affording protection from southwesterly winds both to Breno Bay and Ragusa Vecchia.

Merkan Islet, 220 feet high, with some ruins on it, is the southeasternmost and largest; it lies 1,200 yards outside San Stefano Point, the southern extremity of Breno Bay, and has scattered rocks near the shore here and there, but otherwise the water is deep.

Bobara, the northwestern and smaller islet, is 147 feet high, and, like Merkan, has a chain of rocks extending southeastward from it, leaving a clear opening however between them and Merkan. These islets have steep, rocky coast lines, and the current between them and the mainland runs at the rate of about $\frac{1}{2}$ mile an hour northward.

St. Pietro Islet, about 400 yards in length and 59 feet high, is nearly in a line joining Points Pellegrino and St. Rocco, and about 1,000 yards from the latter, which is the extremity of the little peninsula on which stands the town of Ragusa Vecchia. Between St. Pietro and St. Rocco Point is the Superka Rock above water, and surrounded by a rocky bank, about 200 yards in extent.

Ragusa Vecchia (lat. $42^{\circ} 35' N.$, long. $18^{\circ} 13' E.$).—The town of Ragusa Vecchia occupies the site of ancient Epidaurus, on a little promontory in the southern part of Breno Bay; the inhabitants, who number about 700, are chiefly seafaring men. The ground in the immediate neighborhood is well cultivated, but at a very short distance the land becomes high and barren. Water and small supplies of provisions may be obtained.

The port of Ragusa Vecchia is between the peninsula on which the town stands and the projecting tongue of land southwestward of it, terminating in San Stefano Point; it is open to the northwest. It is about 800 yards in length and from 200 to 400 yards in width, with depths decreasing from 10 to 11 fathoms in the middle to 3 fathoms at the head. It has space for a few small vessels only, which haul close in and make fast to the shore.

Shoals—Buoy.—A rocky 1-fathom spit extends more than 200 yards southwestward from St. Rocco, the northern point of entrance to the port; at 400 yards westward of this spit is a shoal, with $1\frac{1}{2}$ fathoms water, and with a depth of 4 fathoms round it; this latter depth is over a space of about 300 yards in length and is steep-to.

A white spar buoy is moored in $4\frac{1}{2}$ fathoms close northward of the shallowest part of this shoal.

The channels into the port are on either side of the above shoal, but that between the shoal and San Stefano Point is the wider of the two.

Light.—From an iron standard 400 yards southward of St. Rocco Point, and 20 yards within the shore, at an elevation of 33 feet above the sea, is exhibited a fixed light showing as follows: Green when bearing from 129° to 158° , over Superka Rock and the spit extending westward from St. Rocca Point; white from 110° to 129° ; red from 83° to 110° , over the shoal fronting the port; white from 53° to 83° ; obscured elsewhere. In the white, red, and green sectors the light is visible 7, 5, and 2 miles, respectively. The white sectors denote the fairways.

The coast between Ragusa Vecchia and Point d'Ostro on the western side of the entrance of the Gulf of Cattaro, a distance of about 18 miles southeastward, is rugged and of forbidding aspect. It is backed at a short distance inshore by mountainous land, covered here and there with trees. The depth is considerable near the shore, which should be given a wide berth as the sea breaks heavily in strong sea winds, and violent eddies are caused by the current during succeeding calms or light winds.

Albatross Rock.—At 174 yards from the shore and 1,600 yards northwestward of Patkio Point, about 4.3 miles southeastward of

San Stefano Point, is a rock with 10 feet water and has from 5 to 12 fathoms between it and the shore, but it is quite steep-to seaward.

Great and Little Molonta.—About 6 miles northwestward of Point d'Ostro is a small steep rocky peninsula with projections both northwestward and southeastward, forming a bay on either side. The port of Great Molonta is the northwestern bay; it is considered merely a temporary refuge from a southeasterly gale for sailing vessels which may contrive to reach it before the wind has attained great strength. It is open northwestward, from whence a heavy sea at times sets in. There is a depth of 13 fathoms, soft mud and sand, at the entrance and about 7 fathoms at the head. It is usual to anchor near the middle and lay out cables to the shore against the bora.

Little Molonta, the southeastern bay, is greatly protected by Molonta Islet and by a large rock on its northeastern side, both detached from the southern projection of the peninsula; it is quite safe for small vessels in a bora or during northwesterly winds. Southeasterly winds send in a heavy sea, but there is no danger if the vessel be properly moored in a good berth before bad weather sets in. The depth is between 4 and $5\frac{1}{2}$ fathoms, sand, gravel, and shells, good holding ground. Water of good quality may be procured here.

Light.—A fixed red light, elevated 30 feet above the sea, is exhibited on the northeast side of the entrance to Little Molonta, visible 6 miles. May not be lighted during strong winds.

Directions.—The small sailing vessels which frequent Little Molonta do not attempt it with southeasterly winds and rough weather, owing to the sea and to the outset then found at the narrow entrance between the rock and the mainland. Neither is it advisable to attempt to enter either of these ports early in the forenoon, as even a fresh southeasterly breeze commonly fails on a near approach to the land at that time, and a considerable sea would probably be encountered.

Mount Ilino brdo (lat. $42^{\circ} 30' N.$, long. $18^{\circ} 23' E.$), 1,840 feet high, with the Chapel of St. Elia on its summit, slopes to the shore about 3 miles northward of the Molonta Peninsula; this, and the highlands of Cattaro southward, sufficiently point out the position of the Molonta ports, and on nearing the peninsula its grayish wall-like sides are readily recognized. The country in the vicinity is covered with brushwood.

CHAPTER X.

COASTS OF DALMATIA AND ALBANIA FROM THE GULF OF CATTARO TO VALONA BAY.

The coast—General remarks.—The Dalmatian portion of this coast, from Point d'Ostro at the entrance to Cattaro Gulf, to Dubovica Point, 24 miles southeastward of it, embraces the Gulf of Cattaro and approaches. Like the rest of the coast of Dalmatia, it is backed at a short distance inland by a chain of mountains and is generally steep-to. The adjacent country is populous, well wooded, and fertile; the vine is cultivated and produces excellent wine.

The Albanian shore between Dubovica Point and Cape Linguetta, at 105 miles southward of it, recedes considerably, the head of the Gulf of Drin as much as 25 miles. The coast is high and bordered by a continuation of the mountains of Dalmatia as far as the neighborhood of Dulcigno, where it becomes lower; thence to the Bojana River, the country is flat near the sea. Between the Bojana and San Giovanni di Medua it is slightly raised and has the appearance of a wall; inland of San Giovanni di Medua is a vast sandy plain intersected by marshes and bounded by mountains. Southward of San Giovanni di Medua the highlands in the interior disappear except in the vicinity of Durazzo and southward of Cape Linguetta.

Almost the whole coast of Albania is composed of sandy bays, interrupted occasionally by high, steep, rocky points of land. Between the entrance of the Gulf of Cattaro and Dulcigno, the water is generally deep; but, between Dulcigno and Valona Bay to the southward, it becomes much shallower and the bottom is affected considerably during heavy rains and when the rivers are full; attention should therefore be given to the lead when in proximity to this part of the coast.

Depths.—Less water has been found (1913) on the coast of Albania than is shown on the charts; when navigating in this locality, especially off the mouths of rivers, caution should be used.

The productions of the soil are wine, corn, oil in small quantities, and tobacco of good quality.

Gulf of Cattaro—General remarks on anchorage.—This gulf affords excellent anchorage, but for a sailing vessel it is often difficult

and even dangerous of access and exit during October, November, December, and January; it is however, second to few ports in the Mediterranean for a large fleet. The gulf is about 16 miles in extent east and west and consists of four basins, viz, Topla, Teodo, and Rizano Bays and the Gulf of Cattaro proper; for, although the four basins are usually included under the general name of the Gulf of Cattaro, the eastern one on which the town of Cattaro stands is that specially so called.

These basins being surrounded by high land, the greatest caution is necessary, particularly in selecting an eligible berth for anchoring, owing to the suddenness and violence of the squalls which rush down from the elevated valleys both on the northern and eastern sides; but, on the whole, and not including the entrance, they may be considered to afford good anchorages with sufficient depth of water for almost any number of vessels of the deepest draft.

Near the center of the basins, the bottom is generally mud; nearer the shores the mud is mixed with sand and shells.

Vessels are warned not to anchor in the vicinity of the telegraph cables, whose position are presently described.

Aspect—Making the land.—On sighting the land with the intention of entering the gulf, mounts Radostak, 4,744 feet high, and Lovcen or Sella, 5,770 feet high, are excellent guides in clear weather, when they may be seen at a great distance; but during southeasterly or southwesterly winds they are generally obscured, and do not become visible until sufficiently near for the lower parts of the land to be seen. The southernmost mount, Lovcen or Sella, is conspicuous on approaching the coast from any quarter, and, as its name implies, is saddle-shaped; it lies 13 miles from Point d'Ostro, at the entrance, and is only 2.7 miles southeastward of the town of Cattaro at the head of the gulf. Mount Radostak is 2.3 miles northward of the nearest shore in Meljine Bay.

In nearing the gulf, the white lighthouse on Point d'Ostro, the western point of entrance, is conspicuous, and together with the fort just below it, Mamula Fort on Rondoni Islet which is 50 feet high and lies in the entrance channel, and the small round fort on Arza Point on the eastern side, makes the entrance easily distinguishable.

The numerous villages and detached houses on either side, and the cultivation of the lower grounds extending to the very base of the lofty mountains, whose summits appear almost to overhang the shores, render the whole aspect of this gulf one of extreme beauty as well as of magnificent grandeur.

Winds.—The land wind in the Gulf of Cattaro often lasts until late, so that, on nearing Point d'Ostro, a vessel may lose even a fresh southeasterly breeze; it is not prudent for a sailing vessel to close the

land before 10h. a. m. nor after 3h. p. m. It is always necessary to be prepared for the bora, which, even in fine weather, often comes on suddenly with extreme violence. In the winter, it is always difficult to distinguish the land about the entrance to the gulf in southeasterly, southerly, or southwesterly winds; indeed, in a vessel under sail, it is then sometimes impracticable to enter.

Current.—The currents are rapid and uncertain in the Cattaro Passages, especially in the entrance. After heavy rains, they attain a speed of 2 to more than 3 miles an hour, and at other times to about half this rate. In the summer there is but little current.

Signal station.—On the northwestern side of the lighthouse on Point d'Ostro is a semaphore tower painted in horizontal white and black bands, by means of which vessels can communicate by the international code of signals. It is connected with the telegraph system of the Continent.

Lights—Point d'Ostro.—From a decagonal tower, adjoining a two-story dwelling 55 feet high, on the summit of Point d'Ostro, on the western side of entrance, is exhibited at an elevation of 263 feet above the sea, a fixed white light visible 23 miles.

Rondoni Islet.—From a red stone turret on Fort Mamula, Rondoni Islet, in the entrance to the gulf, is exhibited at an elevation of 113 feet above the sea, a fixed light, visible 4 miles.

Mooring buoy.—There is a mooring buoy about 400 yards north-eastward of Rondoni Islet.

Telegraph cables.—Point d'Ostro is connected with Rondoni Islet and with Lustica Point, on the opposite shore, by cable. Lustica Point also is connected with two points on the western shore and with Castelnuovo.

Submarine mining ground.—The submarine mining ground is bounded by the following limits: On the south by a line from Point d'Ostro to Rondoni Islet; on the northwest from Castelnuovo to Njivice; on the east from Port Rose to Savina Convent, westward of Meljine.

Prohibited anchorages.—Anchoring and ground fishing is prohibited in the submarine mining area, except—

(a) In Port Rose and Port Castelnuovo, and in addition for sailing vessels opposite Njivice.

(b) In Kumbor Channel in the area included between lines drawn 180° from Kumbor Pier and from Banic Chapel.

(c) In Krtole and Kukuljina Bays eastward of a line from Casa Verona to Santa Trinita Chapel and thence extended to the southern shore.

(d) In the northern part of the Catene Channel, north of a line drawn from the telegraph tower at Lepetane to Kamenari.

(e) In the Gulf of Cattaro, within the triangular space between Madonna Point and the two telegraph towers at Andric and Perasto.

(f) For anchorage in the southern part of Catene Channel and off the naval establishments in Teoda Bay, except under stress of weather, permission of the naval authorities is necessary.

(g) Vessels must not anchor in the vicinity of any of the telegraph cables.

Directions for the entrance.—The entrance to the Gulf of Cattaro is about 1.3 miles wide; the shores are inaccessible, rocky, and covered with brushwood. It is so exposed to winds and heavy seas from the southward that it is not prudent to anchor in the entrance unless necessitated so to do by calms or currents. Rondoni Islet is clear of danger, and may be passed on either side. If unavoidably compelled to anchor in the entrance where the general depths are from 20 to 25 fathoms care must be taken to avoid a rocky 7-fathom bank about 600 yards 224° from the fort on Lustica Point as well as the submarine cables just described.

In the summer season, to avoid the frequent calms near Kobila Point, it is advisable for a sailing vessel to keep on the eastern side, where the anchor may be dropped if unable to stem the current. This is also a better position to meet the heavy squalls which become more easterly than the regular breeze during heavy rains in the mountains. Care should be taken to avoid being set into the bay on the northwestern side of the entrance, where there is often a heavy sea and the holding ground is bad. Vessels may find temporary anchorage sheltered from easterly winds in Port Zanjca, the bay eastward of Rondoni Islet, but, to secure for a bora, lines should be taken to the shore. On the northern side of Arza Point is a large rock with some ruins on it.

Topla Bay (lat. 42° 26' N., long. 18° 33' E.), the western basin, has a central depth of 20 to 23 fathoms and anchorage in its northwestern part in 6 or 7 fathoms, mud, about 1,400 yards from the shore at the head of the bay and a long ½ mile from Castelnuovo Mole. It is easily reached, but greatly exposed to winds from seaward and is not a good anchorage even in the fine season. At the head of the bay are the remains of salterns and extensive marshes through which the Sutturina River finds its way to the sea. The head of the bay is bordered by shallow water extending nearly ½ mile offshore.

Like the entrance, it is surrounded by high barren land of whitish aspect. Generally, if care be taken to enter the gulf with a good breeze—and sailing vessels should not attempt any of the passages without the prospect of carrying a good steady breeze through—Topla Bay may be easily reached. Between Kobila and Lustica Points, at the inner part of the entrance, the inner and outer currents meet and, with southerly winds, there is often a heavy sea.

Caution is particularly required during the last three months of the year, and in January when southerly winds prevail; even when these winds do not reach the entrance, they often send in a sea, aggravated by the current, which, in the winter season, sometimes runs here at the rate of more than 3 miles an hour.

Castelnuovo is a small town with about 1,500 inhabitants, north-eastward of the entrance, in Topla Bay. It is commanded by Fort Spagnuolo, on a hill 581 feet high. The land in the neighborhood on the northern shore is well cultivated, and provisions may be obtained. There is a watering place near the lazaretto. A railway runs from this place to Ragusa.

Radio.—There is a radio station at Castelnuovo open to the public at all times. The call letters are O. H. C.

Telephone.—There is a telephone station at Castelnuovo.

Light.—A fixed red light elevated 23 feet above the sea, is exhibited from an iron standard on Castelnuovo South Mole, visible 2 miles.

Meljine Bay (lat. $42^{\circ} 27' N.$, long. $18^{\circ} 34' E.$).—The best anchorage in the western basin is in Meljine Bay in a depth of 9 to 12 fathoms mud, about 800 yards southeastward of the lazaretto. Vessels anchor here and small craft make fast to the shore; and, as the bottom rises considerably and the holding ground is good, there is no risk of being driven ashore by them, although southerly and southeasterly winds occasion a considerable sea.

This anchorage is safe during southeasterly, northeasterly, or westerly winds; the last seldom blow longer than 24 hours. The coast between Castelnuovo and the lazaretto is exposed to sea winds and the anchorage off it is not good. (See Prohibited anchorage.)

There are three mooring buoys in Meljine Bay.

Lights.—At Meljine, about 1 mile eastward of Castelnuovo Church, a fixed green light, elevated 29 feet above the sea, is exhibited from the wall of the lazaretto, and is visible 3 miles.

At Zelenica, situated about $1\frac{1}{2}$ miles 97° from Castelnuovo Church, two fixed red vertical lights, elevated, respectively, 16 and 30 feet above the sea, are exhibited from an iron support on the quay; they are visible 3 miles. During strong southeasterly winds these lights are unreliable.

Tides.—It is high water, full and change, at Meljine, at 3h. 38m.; springs rise 9 inches, neaps 6 inches.

Port Rose is a small bay about a mile within Lustica Point and opposite Castelnuovo. It is less than 300 yards across the entrance and has a depth of 6 fathoms, muddy bottom. It is well known to the native mariner as the first place of shelter from southerly winds, and they often anchor here, it being a convenient position for a start outward with the land breeze.

There are two mooring buoys at Port Rose.

Telegraph.—There is a telegraph station at Port Rose, also at Castelnovo.

Kumbor Channel is the connecting channel between Topla and Teodo Bays; it is nearly 800 yards wide at the narrowest part with a depth of 20 to 25 fathoms. Vessels should avoid closing the northern shore after passing Kumbor, just westward of which village a mooring buoy is placed, as the shore is bordered by shoal water, especially from Gjenovic Point eastward, where a shoal, with about one fathom water, extends nearly 300 yards from the shore abreast the village of Gjenovic.

Beacon—Light.—A conical iron beacon, 17 feet high, stands in 6 feet water near the edge of the above shoal, with Gjenovic Point bearing 286° , distance 450 yards.

A fixed red light is exhibited from the beacon, at an elevation of 13 feet above the sea, and visible 3 miles. Reported irregular December 1907.

Coal.—There is a coaling station at Kumbor, where about 10,000 tons of coal, the property of the Austrian Government, are kept in stock, but foreign vessels are only supplied in cases of necessity.

Teodo Bay (lat. $42^{\circ} 26' N.$, long. $18^{\circ} 40' E.$), the middle basin in Cattaro Gulf, is in the form of a triangle, with sides extending 4 miles in length, and its depth nowhere exceeds from 20 to 23 fathoms, generally muddy bottom. It is landlocked and well sheltered from bora gales. Entry is easy in the season of northwesterly winds.

In the winter it is difficult if not impossible of access to a sailing vessel, not only on account of southerly winds, but owing to the strength of the current, which makes it useless to attempt to beat through the Kumbor Channel. Westerly winds are of little avail, as they seldom retain any strength in the Gulf of Cattaro.

The land on the southern side is high, and almost the only dwellings are at the entrance of Krtole Bay. On the northwestern coast near the shore the ground is low, well cultivated, and abounding in country houses under the shelter of Mount Devesile, which rises 2,562 feet above the sea at only $1\frac{1}{2}$ miles from the shore. The northeastern coast is similar to the northwestern, and is sheltered by the highlands of Mount Vermac.

Krtole Bay, in the southeastern part of Teodo Bay, is formed by Otok, Stradioto, and Prevlaka Islets, which extend from the shore in a northwesterly direction; Otok Islet, the westernmost and smallest, has on it a church with a high belfry; Stradioto, the second, is the largest, and is covered with bushes; Prevlaka is between the southeastern end of Stradioto and the shore, and has a chapel on it.

Krtole Bay is on the southwestern side of the islets and is about 600 yards wide. It affords the best anchorage in the middle basin in

depths of 6 to 10 fathoms for vessels of moderate size in southeasterly or northwesterly winds; and, even in the bora, as, owing to its distance from the highland, the heavy squalls from the valleys are comparatively little felt.

In Kukuljina Bay, on the eastern side of Teodo Bay, good anchorage may be obtained in 8 to 10 fathoms, mud; in southeasterly winds the water is quite smooth, and with winds from the opposite direction the inclination of the bottom is favorable to holding on. Caution must, however, be used to avoid too close an approach to this shore from Zeljano Bay southward, as it is bordered by shoal water.

Tognola Reef, nearly awash in places, extending 1,200 yards northwestward from the northern end of Stradioto Islet, should be carefully avoided. The western extremity of this reef is marked by a stone beacon surmounted by two vertical disks; it is elevated 10 feet above the sea, and is painted in white and red horizontal stripes.

In 1880 the international squadron, consisting of 11 ironclads and 6 smaller vessels, moored in two lines along the northwestern shore of Teodo Bay, and reported very favorably of this anchorage as one of the best in the whole gulf in which to ride out a bora.

Piers.—A wooden pier, about 250 yards long, has been constructed, and a coaling depot has been established in Zeljano Bay near Lukovic house. There is a landing pier northward of the wooden pier. Immediately north of the latter a small harbor is formed, with a depth of 9 to 15 feet, by the north mole, which juts westward 200 yards and then turns in a south direction for about 300 yards.

There are four mooring buoys in and to the southward of Zeljano Bay, east side of Teodo Bay, also other four mooring and warping buoys nearer the mole projecting out from the coal store.

There is a telephone station at Teodo.

Lights—Teodo.—At the southern extremity of the mole of the latter harbor two vertical fixed red lights are exhibited, elevated, respectively, 19 and 23 feet above the sea and visible 2 miles.

At the head of the coaling (south) mole, 250 yards southward of the preceding, two vertical fixed green lights, elevated 17 and 22 feet, respectively, above the sea, are exhibited, visible 2 miles.

Beacon.—Close to Zeljano Point there is an iron beacon surmounted by a white ball in about 8 feet water marking the edge of the shoal, near which there is a depth of 6 fathoms.

At night the green lights on a coaling (south) mole in sight clears Zeljano Point Shoals.

Catene Channel.—The channel of Le Catene, leading from Teodo Bay to the eastern or Cattaro Basin, is about $1\frac{1}{2}$ miles in length, with a general depth of from 20 to 22 fathoms, and is less than 300 yards wide at the opening into that basin, the narrowest part.

There are no dangers beyond 50 yards from either shore; the water is deep everywhere. In entering the eastern basin two currents—one from the Cattaro side, the other from Risano Bay—at times cause a race which requires a 3-knot breeze for a sailing vessel to pass through.

Lights.—A fixed red light, elevated 16 feet above the sea, visible 3 miles, is exhibited from an iron turret on Santa Domenica Point on the western side of entrance to the Catene Channel.

A fixed green light, elevated 15 feet above the sea, visible 2 miles, is exhibited from an iron standard on Opatovo Point, on the eastern side of entrance.

A fixed red light, elevated 26 feet above the sea, visible 3 miles, is exhibited from a red iron conical turret, 26 feet high, on Turka Point, at the northern end and western side of the channel.

Telegraph cables.—A telegraph cable crosses the Catene Channel from the sandy spit at the southern extremity of the village of Lepetane to the opposite shore near the village of Kamenari. Another cable crosses the eastern basin within the entrance, from Andric about $\frac{1}{2}$ mile eastward of Madonna Point, to the eastern part of the village of Perasto on the northern shore. The positions where the cables are landed are in each case marked by small white pyramidal stone towers.

The eastern basin is larger than Teodo Bay and consists of the Gulf of Cattaro proper on the east and south, and of Risano Bay on the west and north. Although there is good holding ground in nearly every part of this basin in depths of from 10 to 20 fathoms, it is not often resorted to by sailing vessels owing to the difficulty of access under sail, but a considerable number of native vessels winter in its various corners.

The land squalls are heavier here than in the other basins; the high land rising abruptly from near the coast. The southeasterly wind is also dangerous, particularly under the northern shore, which it reaches in extremely violent sudden gusts. Northerly winds, though squally, never blow here in great strength.

Risano Bay.—Two small islets, San Giorgio and Madonna del Scalpello, connected and surrounded by shoal water and each with a chapel on it, lie in the route to this bay, leaving a passage with deep water on either side of them, that on the western side being the wider of the two.

The small town of Risano—ancient Rhizenium—is in the north-eastern corner of the bay. The inhabitants are given to commercial pursuits and the land in the vicinity is well cultivated, as is also the southern shore; but the western coast, northward of Morinj, is sterile and almost uninhabited. There is a telephone station at Risano.

Water.—A cascade, called Sopot by the natives, issues from a cavern near the town. Water is also abundant in the Morinj River opposite Risano; and, again, at a rivulet close to the small town of Orahovac in the northern corner of the Gulf of Cattaro, which, however, is reported to be of indifferent quality; and along the shore of Perasto, the whole of the eastern basin being plentifully supplied from the high lands which surround it.

Perasto.—The village of Perasto is immediately opposite the Catene Channel and is commanded by Fort Santa Croce.

Lights—Perasto.—A fixed red light is exhibited from a wooden post on the principal quay at Perasto, opposite the entrance to Catene Channel, visible at the distance of 2 miles.

Risano.—A fixed red light, elevated 19 feet above the sea and visible 2 miles, is shown from an iron standard 16 feet high on the molehead at Risano.

Cattaro.—The town of Cattaro, containing about 4,000 inhabitants, is at the southeastern extremity of the eastern basin or Gulf of Cattaro, at the foot of a rocky hill whose summit is separated by a wide valley from the steep mountain range of Montenegro, and is crowned by Fort Vermac at 1,588 feet above the sea. Cattaro is surrounded by an old Venetian wall and protected by batteries, but chiefly by Fort Vermac. It is about 2.3 miles northwestward of Mount Lovcen or Sella, 5,770 feet above the sea and the highest of the surrounding mountains. Stolivo and Perzagno villages lie at the foot of Mount Vermac on the western side of the gulf and are surrounded by gardens; their inhabitants are all mariners, as are the natives of the gulf generally.

The church of Perzagno is large and conspicuous, standing on the slope of the hill away from the village, while that of San Mateo, on the opposite shore, is a ruin and difficult to distinguish, but the point below has a large church on it. The hospital at the head of the bay is a conspicuous building.

Although the inhabitants are mainly of Sclavic origin, the language generally in use here, and indeed throughout the whole Dalmatian coast, is chiefly Italian.

The frontier of Montenegro is close to Cattaro to which there is a military road with numerous zigzags. Cettigni, the capital of that principality, is distant a ride of six hours.

There is a telephone station at Cattaro.

Supplies.—Fresh beef is very inferior at Cattaro; but supplies generally are fairly plentiful.

The port—Anchorage.—It is prudent for large vessels arriving off the town of Cattaro to moor; a fair berth is in a depth of 11 fathoms, mud, with San Elia Point 38° about 400 yards. Shoals extend about 40 yards both from San Elia and San Mateo Points,

also, off the village of Tomic on the eastern shore and from a point about 240° from it on the opposite shore; with these exceptions the coasts of the gulf are steep-to.

Off Cattaro there are two white mooring buoys in deep water to which vessels of war are occasionally permitted to make fast, but they should not be taken by large vessels. The Austrian Lloyd's steamers use these buoys, but they usually run alongside the marina to discharge passengers, etc. The water off the town is fresh, and a vessel's bottom, however foul, soon becomes clean.

Lights—Eustachio.—From an iron support on the shore at Eustachio, on the eastern side of the Gulf of Cattaro and about $2\frac{1}{2}$ miles northward of the town of Cattaro, are exhibited two fixed red lights placed vertically, elevated respectively 23 feet and 9 feet above the sea, visible 2 miles.

Perzagno.—On Shutega Point, Perzagno, from an iron standard, a fixed green light is exhibited at an elevation of 16 feet above the sea, visible 2 miles.

A light, elevated 21 feet above the sea and visible 2 miles, is exhibited from an iron standard on the northwestern end of the quay at Cattaro, showing red when bearing from 62° , through east, to 242° ; white elsewhere.

Directions.—There is no difficulty in a steamer in entering and navigating the several branches of the Gulf of Cattaro, and the depth of water is sufficient for all classes of vessels, guarding against the set of the variable currents. In 1880 the international squadron went as far up as Teodo Bay.

In a sailing vessel bound to the Gulf of Cattaro it is advisable to make the land from the southward on account of the current and to steer for Mount Lovcen or Sella to insure a good position for entering. If the land should be made when steering at right angles to the coast Mount Radostak, 4,744 feet high and about 6 miles north-northeastward from Point d'Ostro, is a good mark for the entrance.

During the fine season, if prevented by unfavorable winds from entering the gulf, small vessels anchor close inshore on any convenient part of the coast; but, except for momentary purposes or in urgent cases, it is better to repair to Traste Bay.

If outward bound and, having passed Kobila Point, the wind should be southeasterly with a heavy sea and the current running, which when opposed by that from the gulf, sets toward the bay in the northwestern part of the entrance, the vessel should anchor immediately. She would then be in an exposed position, but would incur less risk than by attempting to proceed or by endeavoring to return to an inner anchorage, unless with a sufficiently favorable breeze to insure stemming the outgoing current.

If the land wind should be lost before rounding Point d'Ostro it may become necessary to anchor, as it might be impracticable to work out against the coast current and sea breeze.

After passing Point d'Ostro if a vessel should be becalmed before having obtained a sufficient offing she might be drifted into dangerous proximity with the coast between the Point and Ragusa Vecchia. Care should therefore be used to take advantage of the land winds, which occur at all seasons, and to procure a sufficient offing before they are overcome by the sea breeze.

From the foregoing remarks it will be seen that on leaving the gulf in a sailing vessel during the winter the strength of the currents often present serious obstacles.

Traste Bay (lat. $42^{\circ} 22' N.$, long. $18^{\circ} 41' E.$) is about 5 miles southeastward of the entrance to the Gulf of Cattaro, the coast between being steep and irregular, but clear of off-lying dangers. Remo Point, 2 miles eastward of the northwestern point of the bay, is of whitish aspect, and Zukovac Point, nearly the same distance southeastward of the bay, is high and abrupt. The position of Traste Bay may be readily recognized, its head being the low isthmus connecting the hilly peninsula, forming the southern side of Teodo Bay and the Kumbor Channel, with the land southeastward of it, rising from Traste Point to a height of 1,345 feet above the sea at Mount Percia Glava, about $2\frac{1}{2}$ miles from the Point.

Traste Bay is $1\frac{1}{2}$ miles wide at the entrance between Kocista and Traste Point and recedes about the same distance, with depths of from 8 to 16 fathoms, sand and shells; but a rocky 6-fathom patch $\frac{1}{2}$ mile 72° from Kocista Point, the western point of entrance, should be avoided by vessels seeking temporary anchorage here.

The bay is completely open to the southward, but in the southeastern corner under cover of Traste Point there is a cove with good anchorage in 8 or 9 fathoms, sheltered from the bora and from all winds. The church of San Nicolo and the village of Traste are at the head of this cove and there are several forts on the hills around the bay.

On entering the bay, Traste Point should be given a wide berth, as a shoal extends nearly 400 yards off it.

Coast.—**Albanese Rock** lies 162° , distant 2 miles nearly from Traste Point, 314° and 800 yards from Zukovac Point; the rock is awash and almost steep-to, but it should be given a wide berth.

Platamone Point is $4\frac{1}{2}$ miles southeastward of Zukovac Point. If overtaken by a bora near the coast between these points, the best anchorage is close inshore, off a conical hill 1,007 feet high, on the summit of which is San Ilia Chapel; but, on the cessation of the bora or the slightest indication of a southerly wind, which latter is often

preceded by a heavy swell, vessels should immediately get under way. Steep well-wooded hills rise between the two points and the water is everywhere deep close inshore.

Tersteno and Jasi Bays.—Between Platamone Point and Budua, 2.7 miles eastward, are the bays of Tersteno and Jasi, separated from each other by Tersteno Point; the latter bay affords shelter in moderate weather with easterly or northeasterly winds, but, as it is open to the southward, a vessel should leave at once on any indication of wind from that quarter. The shore of the bay is bordered by shoal water.

A short $\frac{1}{2}$ mile from the shore of Jasi Bay, Mount Spas rises to a height of 1,276 feet, and at a distance seaward, has the appearance of an island. It is of pyramidal shape, the steepest side being on the northwest, and on its summit is a monastery; it terminates in Jasi Point, which separates Jasi Bay from Budua.

Coast.—Between Budua and Dubovica Point, about 8 miles farther southeastward, the coast is rather bold and steep-to, with the exception of a few rocks here and there skirting the shore.

Port Budua (lat. $42^{\circ} 16' N.$, long. $18^{\circ} 50' E.$).—Between Platamone Point and Pavlovici, $6\frac{1}{2}$ miles southeastward of it, the coast recedes and forms a bay more than $2\frac{1}{2}$ miles deep. On the northern shore of the bay is the little walled town of Budua on a small sandy peninsula; and at the town is a telegraph station.

The Islet of San Nicolo, about 1 mile long, nearly $\frac{1}{4}$ mile broad, and 397 feet high, lies with its length in a south-southeasterly direction from the town, and with its northern end distant 900 yards from Budua but connected with it by a shoal or ridge upon which there is from $1\frac{1}{4}$ to 3 fathoms water. Another very shallow narrow rocky ridge projects from the same point of the islet in a north-northeasterly direction, forming a natural breakwater and reaching the shore at the head of the bay nearly midway between Budua and Zavala Point; there is no passage over it even for boats except in fine weather.

Port Budua with from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, sand, shells, and mud, is between the town and this last-mentioned ridge. It is sheltered by San Nicolo Islet and also receives considerable protection from the shallow ridges above mentioned. The only passage into the port is over the ridge between San Nicolo Islet and the town in about 12 to 13 feet. The southwestern side of San Nicolo Islet is cliffy, and rocks extend nearly 400 yards. The church on Zavala Point and Fort Zavala, northeastward of San Nicolo, are in ruins, and only the latter can be recognized.

Channel—Buoys.—A white conical buoy surmounted by a ball lies in about 16 feet water on the shoulder of the ridges extending from Budua toward San Nicolo Islet. In entering the port, pass near

the buoy and leave it on the port hand, but no more than about 12 feet water can be depended on in crossing the shoal. Within the port is a mooring buoy about 270 yards eastward of the molehead in about $3\frac{1}{2}$ fathoms.

In the boat channel, with 3 feet water, leading over the easternmost ridge, the steeple of Budua Church bears 288° .

Lights—San Nicolo Islet.—From the top of a small dwelling at the southeastern extremity of San Nicolo Islet is exhibited, at an elevation of 75 feet above the sea, a fixed white light visible 8 miles.

Budua Mole.—A small mole projects from the northeastern part of the town, from an iron standard on which a fixed red light is shown, elevated 20 feet above the sea and visible 2 miles.

Malaluka Bay, eastward of Port Budua, affords a clear space of about $1\frac{1}{4}$ miles square, with a depth of from 9 to 16 fathoms, good holding ground. During summer large vessels may anchor here, but though sheltered from all other directions it is exposed to southerly winds and sea.

During strong southeast winds, better shelter will be found midway between Zavala Point and a white landmark on San Nicolo Island, marked A.S. (anchorage sirocco), in about 8 fathoms.

During the bora or strong northeast winds, there is good anchorage westward of Zavala Point, in about 7 fathoms, abreast a similar white landmark, marked A.B. (anchorage bora).

Coast.—San Stefano is a small village on a little rocky peninsula $100^{\circ} 1\frac{1}{2}$ miles nearly from the southern point of San Nicolo Islet. Near the shore, between San Stefano and Dubovica Point, may be seen houses and some cultivated patches; the higher grounds are covered with trees. Rather more than a mile southward of San Stefano is Grossa Point, rounded and 279 feet high; and $2\frac{1}{4}$ miles farther on is Lastua Castle and a telegraph station. The coast of Dalmatia terminates about 3 miles southeastward of Lastua Castle.

San Domenica and Katic Rocks.—Southward of Lastua Castle are these two little islets or rocks; the former nearest the shore and 108 feet high, has on it the ruins of a monastery; the latter islet is 75 feet high. San Domenica is only 600 yards from the coast, and there is a narrow channel with 6 fathoms water between the reef surrounding the islets and the shallow water bordering the shore. The reef extends nearly $\frac{1}{4}$ mile southward of the islets and is steep-to.

Anchorage can be obtained northwestward of San Domenica Rock, with Lastua Castle bearing 38° , distant $\frac{1}{4}$ mile.

Spizza Bay.—Nearly $5\frac{1}{2}$ miles southeastward of Lastua Castle is Crni Point, the northwestern extremity of Spizza Bay; the point is steep-to, bold, and 515 feet high. About $1\frac{1}{2}$ miles eastward of the point is a battery on high land, and just beyond it the village of

Spizza, where good drinking water and a small supply of provisions is obtainable.

There is anchorage in this bay for small vessels with offshore winds in a depth of 9 fathoms, sand, halfway between the village and Ratec Point, its southeastern boundary, but with onshore winds it is completely exposed. A little more than a mile eastward from the shore of this bay Mount Pettilje rises 2,350 feet above the sea.

Antivari Roads (lat. 42° 06' N., long. 19° 05' E.).—Following Spizza Bay on the south, the shore forms an inward curve round the base of Mount Pettilje, the first part being rocky and then beach, and terminating in Volovica Point which projects northwestward, forming the bay known as Antivari Roads. On the high land overlooking it, and below Mounts Pettilje and Gorni Gora, is Fort Susana, 1,023 feet above the sea.

This part of the coast is backed by high mountainous land, and between 2½ and 4½ miles from the shore the peaks of Mounts Kosa, Rumia, and Lissin rise respectively 3,728 feet, 5,226 feet, and 4,528 feet above the sea.

The frontier line separating the Austrian and Montenegrin territories reaches the shore about the middle of the bay.

Vessels entering the roads should give Volovica Point a berth of about 600 yards, and may anchor in a depth of 8 or 9 fathoms, mud, good holding ground, with the lighthouse bearing 229° distant 1,000 yards.

A rock on the coast situated about halfway between Volovica Point and the customhouse, has been painted white to facilitate anchoring.

Antivari Roads being entirely open to the westward, vessels must be prepared to take every precaution on the usual indications of adverse weather from that direction.

Mole.—From a position about 650 yards eastward of Volovica Point, a stone pier projecting in a north-northeast direction and intended to be 273 yards in length, is being constructed; about 220 yards had been built in June, 1908. Another pier of about the same length will be built out westward from the other side of the bay.

It is expected that the work will be finished in 1909, as well as quay accommodation for the berthing of vessels.

The town of Antivari—ancient Antibarum—is built on a hill in the form of an amphitheater and is about 2 miles inland. It is the chief town of a Montenegrin District, contains with Pristane about 7,000 inhabitants, is fortified and surrounded by a wall. It is said to owe its name to its position opposite Bari on the Italian Coast. From Antivari, Scutari may be reached by a very indifferent bridle road, quite impracticable for any kind of vehicle, the journey taking 10 hours.

Lights—On **Volovica Point**, from an iron standard 24 feet above the ground attached to the light keeper's house, is exhibited at an elevation of 131 feet above the sea a fixed white light, visible from a distance of 10 miles. Shallow water extends 200 yards off from the point.

On the Customhouse Mole at **Pristane**, the village on the south side of **Antivari Bay**, a fixed red light is exhibited, visible 3 miles.

Railway.—A narrow-gauge railway from the port to **Virpazar**, on **Lake Scutari**, will be completed by 1909.

Winds.—In winter, it does not blow hard from the northwest and the anchorage is sheltered from all offshore winds and as far round as about southwest by west; in that season the strongest winds are off the mountains. In summer there are hard squalls from the northwest, with thunder and lightning, but they are soon over.

The coast between **Antivari Roads** and **Menders Point**, about 9 miles to the southward, is slightly indented; here a vessel may anchor if able to reach it when overtaken by a **Bora** gale, but the shore must be closely approached to arrive at a moderate depth of water. The general coast line of the bay is irregular, with two or three coves, whose projecting points are foul, and off the northern point of **Kruci Bay**, the next but one northward of **Menders Point**, is a little islet and some rocks.

Noce Bay, on the northern side of **Menders Point**, has room near the customhouse for a few small vessels in northeasterly and easterly winds. The land rises immediately over the northern side of this bay to a height of 1,447 feet.

Coasting vessels anchor in the southern part of the bay, off a rock painted white, situated about 550 yards westward of the **Health Office**.

Light.—On **Menders Point**, from a mast 170 yards from the shore and at 33 feet above the sea, is exhibited a fixed red light, visible 6 miles. (Unreliable.)

On dark nights a red light is shown for the **Lloyd's** steamers from the **Health Office** in **Noce Bay**.

The **Gulf of Drin** is included between **Menders Point** and the narrow promontory of **Cape Rodoni** 151° distant 26 miles from it. It affords good anchorage all along its shores with offshore winds; the **bora** blows here at times with violence. Care is necessary to keep the lead going when approaching the shore of the gulf as it is bordered all round by shallow water extending some distance off, especially at the mouths of the several rivers.

This gulf is the ancient **Apollonia**, the scene of **Cæsar's** narrow escape with his fleet. In addition to the **Bojana**, the **Drin**, the **Matja**, and the **Jsmi**, some minor streams empty themselves into the gulf.

Dulcigno Road (lat. $41^{\circ} 54' N.$, long. $19^{\circ} 12' E.$).—This is an open anchorage 3 miles southeastward of Menders Point, with depths of 10 to 12 fathoms off the walled town of Dulcigno, ancient Olcinium, which town is in the form of an amphitheater, and being on rather high land is a good mark from seaward at a distance of 12 or 13 miles.

Dulcigno has a population of about 7,200 and some of its buildings are remarkable; it has two high square turrets and five minarets, of which the highest is near the landing place. Dulcigno is six hours from Scutari; the road is fair and horses may be obtained.

Light.—A light is exhibited, at 56 feet above high water, from the old fort on the coast at Dulcigno.

Landing can nearly always be effected at the mouth of the small river close eastward of Derana Point, $1\frac{1}{4}$ miles southeastward of Fort Dulcigno, whence Scutari can be reached by road.

The coast from Menders Point trends east-southeastward 22 miles to Port San Giovanni di Medua, at the head of the Gulf of Drin. Between Menders and Derana Points, a distance of about 5 miles, the coast is about 500 feet high; it then diminishes rapidly in height until in the vicinity of San Giovanni di Medua.

There is anchorage all along this part of the coast from Dulcigno eastward during land winds and the bora.

Guri Geranis Islet, 4 miles southeastward of Dulcigno and nearly a mile from the shore, has 8 fathoms water inshore of it; the islet is 13 feet high, of a light reddish color, with a sunken rock outside it, and has a depth of 10 or 11 fathoms close-to.

Bojana River has its source in Lake Scutari, and, with a varying width of from 100 to 150 yards, runs into the sea about 8 miles southeastward of Dulcigno. Near its mouth it divides into two branches, forming a considerable delta overgrown with rushes. For such vessels as can generally enter the river is navigable nearly up to Lake Scutari, and vessels of about 150 tons can go more than half the distance; the natives pole their boats all the way. During heavy rains the current is very rapid and overflows the banks, and the mouth is subject to considerable change.

The country is thickly peopled between the mouth of the river and Scutari to a distance of 11 or 12 miles on either side. The distance by the river to Scutari is about 24 miles; it has been repeatedly ascended by boats in former years, and no difficulty or obstacle experienced except the strength of the stream, which under ordinary circumstances is from $2\frac{1}{2}$ to $3\frac{1}{2}$ knots. An ordinary whaleboat has accomplished the ascent in 12 hours and a steam pinnacle the descent in $2\frac{1}{2}$ hours.

The southeastern entrance in June, 1914, was the deeper, and there was then a depth of about $4\frac{1}{2}$ feet on the bar. The seaward side of

the bar is very steep, the depth decreasing from 5 fathoms to 1 fathom in about 100 yards. Within the river it deepens gradually to 7 feet and more. The least water is on a narrow ridge about 50 yards across. The passage across the bar is marked by stakes (branches with a tuft of twigs or leaves at the top); there is always one in position and sometimes more, but there is no rule on which side to leave them.

The bar often breaks from a swell when it is practically calm at the anchorage, and a comparatively light local wind (force about 4) from seaward will quickly raise a surf. The sea on the bar rose very quickly and with little warning in June, 1914. A southerly wind increases the depth on the bar, but at the same time raises a sea.

The rise of the tide is about 1 foot, and the state of the tide influences the conditions on the bar considerably. There is good anchorage inside the bar anywhere seaward of Pulej in from 8 to 15 feet water, sand, and mud.

There is a small boat channel, with about $1\frac{1}{2}$ feet water, to the eastward of the main channel over the bar, and the pilot states that a small boat can often get out this way, when the main channel is impassable; a pilot is necessary.

The river steamers can often pass the bar, when it is impracticable for boats, as they are made to take the ground, and, with their comparatively high sides, are not affected by breakers which would be dangerous for boats.

If it should be required to communicate with Scutari from the sea by river, much time might be saved by hiring one of these steamers as the possibility of delay from boats being inside and unable to come out is reduced.

The general depth in the channel of the river is over 8 feet (June, 1914), and the river presents no difficulty in navigating, as the probable position of the banks can, usually, be easily seen. A pilot is necessary for a stranger.

In the bends at Luargi and at Biela there are strong tide rips, and care is necessary in steering.

Several vessels were sunk in the river during the late war. There is a wreck below San Giorgio, and several at the bend below Gorico Hill; these must be avoided. In the reach above Gorico there are large shoals along the starboard side (going northeastward), while about halfway along the reach there is a shallow (bar) which the pilot states has 3 feet water at low river; it had 5 feet in June, 1914. Above Oboti navigation of the river becomes more difficult, and just below Daragathe is a crossing with about $4\frac{1}{2}$ feet water (June).

Where the Drinassa River runs into the Bojana there are considerable mud banks and islets covered with reeds and bushes; care is

necessary here, particularly if towing boats, as the crossing is shallow (5 feet in June), and the current is very strong and sets across the channel, so that if caution is not used, the last boat of the tow may be thrown on the bank. Abreast the citadel the northwest bank is a cliff just at a turn; the current sets directly on to this cliff and forms a strong race, which also requires attention in steering.

Immediately above this two lines of stakes indicate the channel which then leads between two reed-covered islets. There are two sets of stakes, one on each side of the river; those on the eastern side are the ones to pass between.

There is anchorage either above or below the bridge, above it being the better, as there is less current; steamboats' funnels and ensign staffs must be taken down to pass under the bridge, but for vessels that can not go under one section is made to draw.

The pilot boat towing launch, two cutters, and a whaler, all laden, ascended the river in 7 hours and returned in about 2½ hours.

The current was estimated at 2 knots in the lower reaches of the river, 3 knots at Oboti, and 4 knots just below Scutari. With a higher river the rate would be greater, and the pilot stated that it attains about 6 knots.

Pilots can be obtained at Pulej, or through the harbor master at Port San Giovanni di Medua. The pilot for the mouth of the river lives at Pulej, and comes out to vessels; he was found to be trustworthy; the river pilots depend on this man for crossing the bar.

Pulej is a village of about a dozen houses, painted white, with red roofs.

An Albanian official, who acts as health officer and generally as captain of the port, lives here.

The Roman Catholic Church is a large white building on a small hill above the village.

There is a small pier abreast the port office, with 5 feet water alongside its head.

San Nicolo village, on the west bank, is small, with a Greek church; a Montenegrin health officer lives here.

San Giorgio.—A small tributary, the outlet from Lake Schass, joins the river at San Giorgio; at the junction is a corn mill with a tall chimney.

The hill at Luargi is a rocky knoll with scrub on the side.

Biela.—The hills on the south bank below, and on the west bank above Biela, are steep and rocky. There is very little cultivation below Biela, but a fair amount above it.

Oboti consists of a barracks, about eight stone houses, and some thatched cottages. Steamers frequently can not get above this, and hulks are moored here for the river steamers to lie alongside and discharge their cargoes.

Two or three flat-bottomed lighters (about 60 feet by 15 feet) are kept here to take cargo to Scutari from vessels unable to proceed above this village.

The depths at the two entrances vary greatly; sometimes one and sometimes the other being the deeper.

Communication.—Three steamers of about 200 tons (two Austrian and one Italian) call here every week and proceed up the river as far as Oboti.

The telegraph lines were destroyed in the late war. A native messenger can be sent on horseback from San Nicolo to Scutari, and takes about five hours for the journey.

The Austrian and Italian steamers between them maintain almost a daily service.

Telegraph.—There are telegraph offices at Pulej and San Nicolo in connection with Scutari; delays and inaccuracies are to be expected.

Pratique.—There is a pratique office at Pulej, the village on the eastern bank of the river just inside the entrance, and the authorities are particular not to allow any communication with the shore, or to permit any boats to proceed up the river until pratique has been obtained.

Supplies.—A limited supply of native bread can be obtained at about 5d. a pound.; this bread, which is dried, is dipped into water before eating and is quite good. Small quantities of eggs and poultry can also be procured.

Scutari (lat. 42° 04' N., long. 19° 31' E.).—The town of Scutari, ancient Scodra, named by the Turks, Iscudar, is the capital of the province of Albania and the residence of the governor. It is on the slope of a hill crowned by a fort 2 or 3 miles from the southeastern end of the lake. It is in communication by telegraph with Pulej at the mouth of the Bojana, and with Durazzo, Valona, Otranto, Corfu, etc. Its population is about 37,000.

The British naval vessel *Diana* reported in July, 1905, that the town of Scutari was practically destroyed by recent earthquakes, and that the inhabitants were then sleeping in the roads and in the open, as shocks of earthquakes still occurred; the citadel and barracks, which stood on a rock about 400 feet above the plain, had been thrown down. The bridge over the Drinassa River has fallen down.

Scutari Lake, some 65 feet above sea level, is about 20 miles long and from 3 to 6 miles wide; it is in the middle of a fertile, well-populated plain and receives the waters of the Moraca and of several other rivers which flow from Montenegro and from the mountains eastward. It has abundance of fish; large boats are employed on it, and its navigation, except during heavy floods, is reported to be easy, there being no hidden dangers. There is a railway from Virpa-

zar, at the northwestern end of the lake, to Antivari. The water in the river on leaving Scutari Lake is suitable for use in steamer boilers.

Bojana Anchorage.—There is anchorage off the Bojana River with offshore winds, and a steamer with fair power and moderate attention could put to sea in almost any weather. A good summer berth is in a depth of 6 or 7 fathoms, $1\frac{1}{2}$ miles from the shore, with a white house on the eastern side of the entrance bearing 19° ; or in a large vessel, farther out in 9 or 10 fathoms.

Anchorage has been obtained in 12 fathoms, mud and good holding ground, with Pulej bearing 348° , distant 3 miles.

In approaching the anchorage off the mouth of the river Pulej shows very clearly with the large white church just inside it. The 102-foot hill near San Nicolo is noticeable as it rises above the surrounding trees, and is covered with bushes and large bare patches of red earth, the latter being conspicuous. The 82-foot hill near Pulej is not noticeable.

Care is necessary to give the entrance of the river a wide berth, as the bank fronting the delta, with less than 3 fathoms, extends nearly $\frac{3}{4}$ mile from the shore and is said to be growing seaward. The bank is formed by the stream from the river, but is subject to shifts from time to time, especially during southeasterly gales. The mouth of the river may be known by the white two-storied house before mentioned, a guard house, and the small chapel of San Nicolo. The land here is low, well-wooded, and extends perfectly level for some miles inland to the base of the mountains.

Port San Giovanni di Medua.—In the northeastern part of the gulf and nearly 11 miles southeastward of the Bojana River entrance, where the land has again become high, is the little port of San Giovanni di Medua, or Chinkin according to its Turkish name, affording sheltered accommodation for about a dozen small vessels in from $3\frac{1}{2}$ to 4 fathoms water secured to the shore.

The port is a small bay receding about 800 yards northward, and is protected by a shallow bank projecting eastward from San Giovanni Point on its western side; this bank, which is steep-to, is marked by beacons and covers the port from the south.

There is little to indicate the position of the port until a vessel has approached closely to it. It may be known by San Giovanni Point, being the eastern extremity of the only spur of the neighboring ridge of hills whose base is washed by the sea. This rocky shore is about a mile in length, and its eastern extremity, as before explained, forms the western side of the port; with this exception the sandy beach extends for miles westward and southward of it.

Town.—San Giovanni di Medua is most unhealthful during the summer months, but the malaria and fever cease by the middle of

October. It is said that few escape who visit it during August and September, however short a stay they may make, and the appearance of the people and country tend to confirm this statement.

Mooring buoys.—Two red mooring buoys are placed close together on the northern bank of the port; a vessel anchors and lays out a stern hawser to the buoys.

Boat piers.—The pier near the customhouse has 10 feet water at its outer end, and is strong enough for steamboats to go alongside. Immediately southward of it are two small piers for light boats. On the shore near the position of San Giovanni Church is a light pier with 3 feet water at its head.

Water can be obtained from a well near the position of San Giovanni Church; it is said to be good, but water obtained from the stream, or near it, at the head of the port is bad.

Communication.—Before the European war vessels of the Austrian Lloyd Societa in Azioni, Ungaro-Croata di Navigazione, Societa Anonima di Navigazione a Vapore, "Puglia" bari, called at Port San Giovanni di Medua regularly.

The road to Scutari, viâ Alessio, is good enough to be used by motor cars and lorries.

Telegraph.—There is a telegraph cable between San Giovanni di Medua and Brindisi.

Light.—From a staff on a white house with red roof on San Giovanni Point, at an elevation of 59 feet above the sea, is exhibited a fixed red light, visible 6 miles; close by this house is the keeper's house, with a red roof.

Anchorage.—There is anchorage in San Giovanni di Medua road in a depth of 11 or 12 fathoms, sand and mud, with San Giovanni Point bearing 27° distant 1.3 miles, and about the same distance from the eastern shore of the gulf; and although this berth is exposed to the southwestward, it is said to be safe, as a gale from this quarter is unknown in this locality, and it is well sheltered from the bora and sirocco.

Beacons.—There is a patch above water near the eastern edge of the shallow bank projecting eastward from San Giovanni Point.

Two beacons mark the edge of the bank—a staff, painted red and white in horizontal stripes and surmounted by a globe, on the eastern edge of the bank near the dry patch, from which a light is shown; and a staff, surmounted by a triangle, marks the northern side of the bank.

A beacon, a staff only, marks the northeastern side of the entrance.

On the hill side close to and above the lighthouse is a large yellow barracks with a red roof, and there are two other houses on this point visible from the southwestward; the barracks can be seen from a considerable distance.

On the hill behind the port, and about $\frac{3}{4}$ mile northeastward of the lighthouse, is a white wooden cross on a white stone pyramid.

Gulf of Drin.—There is anchorage in moderate depths, up to 25 fathoms with mud bottom, all over the Gulf of Drin in northerly and easterly winds, but the best place is in Rodoni Roads, on the northern side of the promontory of that name; here a vessel lies sheltered from southwesterly winds in depths of 12 or 14 fathoms, with the cape bearing 263° or 266° distant $2\frac{1}{4}$ miles, and about 1 mile from the southern shore of the bay. Small vessels may go farther in.

Drin River, the largest of the four rivers before mentioned, except the Bojana, is navigable by boats as far as Alessio, ancient Lissus, a small town on a hill in a fertile plain on the eastern bank. From Alessio, there is a fair road to Scutari, and this is said to be the best place from which to communicate with Scutari.

Caution.—From a survey (1899) considerable alterations had taken place in the outline of the coast of Albania between the Gulf of Drin and Vojuca Point since the survey of 1870.

Mariners should navigate along this coast with caution.

Cape Rodoni (lat. $41^{\circ} 35' N.$, long. $19^{\circ} 27' E.$).—The promontory which terminates in Cape Rodoni, or Ischin in Turkish, is narrow, from 500 to 675 feet in height, steep and bare near its extremity, but covered elsewhere with vegetation and trees. It stands up conspicuously from the low adjoining ground northward and southward, stretching out about 5 miles northwestward, and is a good landmark.

The cape has a lighthouse at its extremity and is bordered on either side by shallow water, which also extends about $1\frac{1}{2}$ miles northwestward of the cape; it should therefore be given a berth of about 2 miles in rounding and attention be paid to the lead.

Light.—From a white lighthouse 33 yards within the extremity of Cape Rodoni, at an elevation of 131 feet above the sea, a flashing white light is exhibited, which is visible 16 miles.

Anchorage in Rodoni Roads, see preceding page.

Lales Bay.—**Cape Pali** lies about 11 miles southward from Cape Rodoni; the low shore between is a sandy beach and recedes, forming this rather deep bay, with depths of from 7 to 13 fathoms in line between the two points and shallow water all around the shore, especially in the southern part, where it extends off 2 miles.

The cape is hilly and covered with trees; it juts out about 2 miles in a northwesterly direction, the extremity being rather lower than near the middle; shallow rocky bottom extends about $\frac{3}{4}$ mile northwestward from the cape, and it should be given a berth.

Cape Pali Road is on the northeastern side of the cape; from the shallowness of the water, it affords shelter from southwesterly winds to small craft only. The Arzen River runs into the sea about $3\frac{1}{4}$

miles northeastward of Cape Pali; other streams also empty themselves in the bay.

In the northeastern part of Lales Bay temporary anchorage may be obtained during a bora in 4 to 7 fathoms, mud, at 1 to 2 miles from the shore.

The head of Durazzo Lake approaches the southern shore of the bay within $\frac{1}{4}$ mile, and just within the beach, about midway on the eastern shore, is a lake $2\frac{1}{2}$ miles in length.

Durazzo Cape and Lake.—The coast from Cape Pali southward rises to upward of 600 feet in height at about $1\frac{1}{2}$ miles north of Cape Durazzo, and within it is Durrazzo Lake, 5 miles in length. Cape Durazzo, a high, round, sugar-loaf hill, lies $6\frac{1}{2}$ miles southward of Cape Pali, and the whole of this coast is bordered by a rocky bank extending in places some considerable distance from the shore.

Cape Laghi, 10 miles southward of Cape Durazzo, between which is Durazzo Bay, is comparatively low, and projecting but a short distance; it is covered with brushwood and has a church on its summit.

Durazzo and Talbot Banks.—The Durazzo Bank, with less than 2 feet water, terminates in $4\frac{1}{2}$ fathoms at $1\frac{1}{2}$ miles southward of the cape. Separated from the tail of the Durazzo Bank by a distance of about 200 yards with $5\frac{1}{2}$ fathoms water is the Talbot Shoal, which, within the 5-fathom curve, is about 1,100 yards in extent, and on its northern half the depth is only from 2 to 3 fathoms.

Buoy.—A conical red buoy in 5 fathoms lies off the southeastern edge of Talbot Shoal, with Durazzo Lighthouse bearing 16° , distant $1\frac{1}{2}$ miles. This buoy can not be depended upon.

Durazzo Bay, situated between capes Durazzo and Laghi, is about 4 miles deep. The capes form the only exceptions to the lowness of the shore on this part of the coast, which is bordered all around by shallow water extending from 1 to 2 miles off; and in southwesterly and westerly winds, when the weather is thick or hazy, it is difficult to make out the land about the bay in which there are numerous outlying shoals and from 25 to 30 fathoms water not more than 3 miles outside the dangers.

The town of Durazzo, ancient Dyrrachium, is partly on the slope of Mount Durazzo and partly in a pretty valley southward of it. It is a fortified and walled town with a population of 8,000, and was the emporium of the commerce of Rome with Greece. It is the chief center of trade in Albania, and as many as 20 or 30 small vessels are sometimes to be found here.

Conspicuous objects.—The following are conspicuous: The trees in the palace gardens near the light mast; a round tower on the hill above the town; a church to westward of the tower, white, with a red roof, and small white cupola; and the minaret at the mosque.

Pier.—There is a wooden pier with 5 feet of water alongside.

Water.—Shore water is from surface wells, and must be boiled before use.

Health.—Malaria is prevalent in summer, and Europeans suffer from bowel complaints.

Light.—A fixed light showing white and red sectors, is exhibited from a white steel skeleton mast, 51 feet high, on a white house near the quay at the southeastern angle of Durazzo, at an elevation of 52 feet above the sea. The white light is visible 10 miles, red light at 6 miles.

Directions—Anchorage.—The anchorage is inside the Durazzo and Talbot Banks and eastward of a line drawn south, (Mag.) from the eastern end of the town, and as far north as convenient, but avoiding the shoals fronting the town. Westerly and southwesterly winds send in a considerable sea.

In approaching Durazzo Anchorage the Sasso Bianco, a white rocky hill 336 feet high (white cliffs) on the eastern shore of the bay, is a good guide from the offing; it should be brought to bear 83° and steered for until the southeastern extremity of the town of Durazzo bears 359° . The Talbot Shoal has then been passed, and a course may be steered for the eastern side of the town and a berth taken up as convenient, but according to the vessel's draft of water, the soundings here being all very shallow, from $4\frac{1}{2}$ to 3 fathoms only. When Cape Laghi is obscured and Sasso Bianco can not be seen it is not prudent to steer for this anchorage.

In entering the bay at night a vessel should not approach the light nearer than 3 miles until having passed from the red sector shown over Talbot Shoal to the inner white sector of light bearing westward of 353° ; then haul up north for the anchorage. The lead should always be kept going, but it is not advisable to enter without local knowledge.

Coming from the southward at night Durazzo light, showing red, may be steered for when bearing eastward of 27° , which leads well clear to the westward of Selada Banks; thence as above.

The Kavaja and Dartsch Rivers empty themselves in the southeastern part of Durazzo Bay.

Selada Banks.—From Cape Laghi for a distance of 4 miles northward and more than $2\frac{1}{2}$ miles from the shore of the southeastern part of Durazzo Bay, the whole space is shallow and dotted with rocky patches with as little as 2 to 9 feet water. The outer chain of these dangers runs northward from Cape Laghi and the Selada Banks at their northwestern extremity, lie north 3.3 miles from the cape; from the shoalest spot on the Selada, $1\frac{1}{2}$ fathoms, the church on the brow of the hill near Barbaut Point bears 129° ; and Robit Hill, 180 feet high, a short $\frac{1}{2}$ mile in from the beach, 70° .

These banks should not be approached within a less depth than 25 fathoms and at night, as stated with directions for Durazzo.

Buoy.—A conical red buoy, in a depth of 6 fathoms, lies nearly 400 yards westward of the outer edge of Selada Banks, with Calaja Church, 168° , distant nearly $3\frac{1}{2}$ miles. This buoy can not be depended on.

Coast.—From Cape Laghi to Cape Treporti, Valona Bay, about 40 miles farther southward, there are no remarkable objects by which positions may be identified. The shore is one uninterrupted sandy beach with numerous small sandhills, and behind it is a desert plain intersected by marshes and lakes as far as the hills in the interior. The coast affords no shelter and is everywhere bordered by shallow water, the 5-fathom curve being in places more than 2 miles from the shore.

Between these capes, three rivers run into the sea, viz., the Skumbi, the Semeni, and the Vojuca. The mouth of the Skumbi is 8 miles southward of Cape Laghi. The Semeni mouth is about the same distance farther on; the source of this river is in Mount Tomor and formerly, after an irregular course through the plain, its outlet was 6 miles farther south, where it had formed Samana Point projecting upwards of 3 miles beyond the line of coast. The Vojuca, whose source is at the foot of Mount Pindo, reaches the sea about 8 miles southward of the Samana Point; its former mouth was $3\frac{1}{2}$ miles farther southward.

The mouths of these rivers are all subject to great alterations; and as the alluvium deposit around their mouths causes the water to be shallow for some distance off, and the shallows constantly to increase in extent, great care is necessary when navigating in their vicinity.

Light—Samana Point.—About 600 yards from the southwestern side of Samana Point, from a white iron mast on dwelling near by, are exhibited at an elevation of 52 feet (higher light) above the sea, two fixed white lights, placed vertically, visible 10 miles.

Cape Treporti (lat. $40^{\circ} 30' N.$, long. $19^{\circ} 25' E.$), the northeastern limit of Valona Bay, is not a very prominent point, but being a mixture of rocks and earthy matter 94 feet high, it forms some contrast with the general aspect of this low sandy part of the Albanian coast. It is skirted by rocks which extend about 150 yards offshore, and from the Vojuca southward, the 5-fathom curve is from 2 miles off the coast in the northern part to 1 mile near the cape.

Saseno Island, off the entrance of Valona Bay, lies 3 miles northward of Cape Linguetta, the northwestern limit of the bay, and $4\frac{1}{2}$ miles from the nearest part of the mainland. The island is $2\frac{1}{2}$ miles in length, steep-sided, and 1,087 feet high; it has two conical hills, which, at a distance, give it the appearance of two islands; its sea

face has several caves and clefts in the rocks, the abode of pigeons. It is uninhabited, except occasionally by shepherds, who find some little pasture for their flocks.

There is temporary anchorage off San Nicolo Bay, on the northeastern side of the island; the holding ground here is good but sheltered only from southerly and westerly winds.

Light.—On the western part of Saseno Island, about $\frac{1}{2}$ mile from the northwestern point, in approach to Valona Bay, is a white stone lighthouse 44 feet high, from which is exhibited at an elevation of 650 feet above the sea, a fixed white light, varied by a flash, visible 25 miles. The tower rises from the southwestern side of a white dwelling. When southward of Cape Linguetta, however, vessels bound northward from Corfu Channel do not sight this light until it opens off the cape bearing 349° .

San Nicolo Bay—Light and beacon.—A light is shown from the top of a white building on the shore near the root of the mole at San Nicolo di Saseno, and an iron beacon, with a spherical topmark, painted white, stands on the head of the mole.

Telegraph cable.—A telegraph cable leaving the shore of Valona Bay at the small white telegraph house, about $1\frac{1}{2}$ miles westward of the town of Valona, passes in a westerly direction through the channel between Cape Linguetta and Saseno Island, and thence direct for Otranto.

Valona Bay.—This spacious bay is comprised between Capes Treporti and Linguetta; it is about 5 miles wide at the entrance with depths of 20 to 10 fathoms for about a mile eastward, then shoaling toward Treporti. The bay within is about 9 miles in length, with general depths of 20 to 28 fathoms. For some distance southward of Cape Treporti the coast is low and sandy, with shoal water extending over a mile offshore, and to be cautiously approached, as the shoal water has been reported to be still extending. Farther south, the coast is backed by hills of moderate height.

The shore around Port Dukati, the head of the bay, is low and just within it is Paschiliman Lake or Sea, in the vicinity of which the ground is marshy. The southwestern side is high and almost precipitous; the land rising at Mount San Vasilio 2,750 feet above the sea and terminating northward in Garlovez Point and Cape Linguetta.

Its position near the entrance of the Adriatic gives importance to the bay as a place for sailing vessels to find shelter if overtaken by a southwesterly gale on entering or by southeasterly or easterly winds on quitting this sea.

Anchorage.—Vessels visiting the bay in the summer for a short stay generally anchor between the Skala or landing place for Valona

on the northeastern side of the bay and the lighthouse on Pelasgia Point, in a depth of 10 to 13 fathoms, mud and weed. Northwestern winds send in a heavy sea at this anchorage and the bora is severely felt. Those intending to remain longer should proceed to Port Dukati, the head of the bay, where there is shelter from all winds; the best anchorage is said to be about 1,200 yards northwestward of Nisvoro River entrance, in a depth of 16 fathoms, stiff mud. Raguseo Cove, an indentation in the western side of the bay, is well sheltered on all sides with a depth of 10 to 12 fathoms. Port Dukati is a quarantine anchorage, and probably permission is necessary to anchor here.

The town of Valona, ancient Aulon (lat. $40^{\circ} 28' N.$, long. $19^{\circ} 30' E.$), is at the foot of a cultivated hill a long mile from the Skala. The hills southeastward, on one of which the castle of Kanina stands very conspicuously, are thickly covered with olive trees. It was formerly populous but now contains only about 5,000 inhabitants. There is but little trade; salt is the chief product. The arms formerly manufactured here were held in high esteem.

Two small streams, one on the western side of the bay and the Nisvoro at its head, afford facilities for watering; the latter stream abounds in fine trout. There is good seining in Port Dukati.

There is good shooting to be had in Paschiliman Lake, but the natives in this locality are untrustworthy. Officers should never land alone, and a Zapiti or Turkish guard should always be obtained (by permission at Valona) for fishing or shooting parties.

Light.—On Pelasgia Point, nearly $1\frac{1}{2}$ miles southward of the Skala, is exhibited from a window in a small white dwelling with red roof, at an elevation of 82 feet above the sea, a fixed red light, visible 6 miles.

Directions.—Cape Linguetta and Saseno Island with its lighthouse are easily recognized; the cape is a continuation from the southward of the coast range of mountains, and at Mount San Vasilio, about 2 miles from its termination, is, as previously stated, 2,750 feet high.

When making the land from the northwestward, until Saseno Island is seen, a course should be steered for the high mountains of the interior, which are covered with perpetual snow. In passing the Vojuca River and Cape Treporti, the coast should not be closely approached on account of the shallow water which borders it, and the lead should be kept going; the current, as frequently remarked, sets to the northward.

The southern channel, between Cape Linguetta and Saseno, is $2\frac{1}{2}$ miles wide, and deep, but, in entering the bay by it, the northeasterly set of the current through the passage should be borne in mind,

though it is not very strong except during southeasterly winds, when it is advisable in a sailing vessel to borrow rather upon the Linguetta side. During these winds, a good lookout must be kept for violent squalls from the high lands in the neighborhood.

The telegraph cable is laid in this channel, and anchoring must not be taken in its vicinity.

CHAPTER XI.

COAST OF ALBANIA—CORFU AND ITS ADJACENT ISLANDS.

General remarks.—This chapter contains the description of the coast of the Turkish Province of Epirus, being that part of Albania beginning where the coast approaches nearest to that of Italy at the entrance of the Adriatic, together with Corfu, the northernmost of the Ionian Islands, and its adjacent islands, now an integral part of the Kingdom of Greece. The Albanian seaboard southward from Cape Linguetta to the Gulf of Prevesa is, in a straight line, about 115 miles. It generally presents to the eye a beautiful aspect, lofty ranges of mountains and hills being separated by fertile valleys and plains. There are but few villages on the coast, and the population is scanty.

Winds.—During summer, northwesterly winds are most prevalent, but in winter those from the southeastward. In settled summer weather, when the barometer is high, and often in winter, land and sea breezes prevail. The land wind blows from the mountains through the valleys and reaches a longer or shorter distance from the coast according to the season, occasionally, but very rarely, 20 miles, though usually not beyond 10 miles. This wind is light and in Epirus blows from north to northeast; in the Gulfs of Patras and Corinth, from northeast to east; on the coast of Arcadia, from north to northeast; and on the southern coast of the Morea, out of the gulfs.

It commences to blow two or three hours after sunset and increases in force until after midnight, when it decreases, falls calm at sunrise, freshens again with the rising of the sun, veering some points eastward, until about 9h. a. m., after which it dies away and is succeeded by the sea breeze.

The Imbatto or sea breeze sets in between west-southwest and northwest generally about 10h. a. m. and at times an hour or two earlier, but rarely so late as noon. It increases in strength in the first two or three hours, attaining its maximum about 3h. p. m., when it blows fresh and then gradually decreases in force and dies away an hour or two after sunset. This alternate land and sea breeze renders the climate of Ionia healthful, and the sea breeze becomes refreshing during the hours of the greatest heat.

The prevailing wind in the offing in summer is from between west-southwest and northwest; it is general during the months of July and August, producing a clear sky and dry atmosphere in Greece and varies in direction during the 24 hours, veering southward of its normal direction during the forenoon and then by degrees to the northward of it, where it remains steady during the night. When bound westward advantage should be taken of this changing direction of the wind.

In the summer there are at times passing storms of but short duration, perhaps lasting a couple of hours; they are somewhat violent and in the inner channels are foretold by large black clouds gathering in the interior valleys of the islands and bursting in dangerous squalls over the narrow seas, accompanied by rain or hail so heavy as to shut out all view of the neighboring land. Should the sky therefore be threatening, with slight oscillations of the barometer, caution becomes necessary.

At night the approach of a fresh breeze may be heard.

The Tarantata.—As in winter during two or three days, so also in summer for 24 hours, a strong breeze from the northwest blows in the eastern part of the Ionian Sea; it is called the Tarantata because it comes from the direction of the Gulf of Taranto. These strong winds or gales are of such force that small craft have to bear up before them.

The Sirocco, or southeasterly wind, predominates in November and December and in February and March after an interval of a month again sets in. Its leading features are the same as in the Adriatic (see Chap. I); it is preceded by the falling of the barometer, by a mild close atmosphere, objects appearing above their natural position, by less wind, and by dark clouds on the summits of the land. It sets in with heavy clouds, a thick atmosphere, rain, and much sea.

During August and at times also during July this wind gives place to the dry Sirocco, a moderate wind without rain, which, blowing from Africa at this season, completely gains the ascendancy and causes the heat to be very trying. This Sirocco is more easterly during the morning, more southerly in the afternoon, and, at times, during the night veers to southwest; its force in the day time is then always greater than at night.

The Sirocco each year blows partially during an entire month and after a brief period of calm blows again with its usual force for another 14 days.

In winter, with ordinary weather and northeasterly winds in the Adriatic and Archipelago the mountains of Epirus and Greece are usually covered with snow and at times the plains at their base, where it remains for several days, the atmosphere being thick, the

cold intense, and the weather stormy round the southern coast of the Morea and at the entrance of the Archipelago, with a heavy sea southward of Cerigo.

Currents.—A general current sets from the Archipelago and along the coast of Greece toward and into the Adriatic; in settled weather, its rate is about $\frac{3}{4}$ mile an hour, though in the channels of the Ionian Islands from local causes there may be a divergence from this rule. It decreases in strength in proportion to the distance from the land, increases in velocity with southeasterly winds, and still more with strong westerly winds.

Aspect.—The high mountains of Albania and Greece are visible from seaward at a great distance; and, when coming from the westward there is no position from whence in fine weather land can not be sighted at a distance of more than 50 miles from the coast. The mountains of Cika, in Albania, are seen when southwestward of Cape Santa Maria di Leuca before even that cape itself can be distinguished. Mount Nero, 5,218 feet, the highest mount in Cephalonia, is also visible at a distance of 80 miles, and is usually the first land sighted from the westward. Vessels on a more southern parallel will sight Mount St. Elias or Makryno rising 7,900 feet above the sea about 7 miles from the eastern shore of the Gulf of Kalamata.

The aspect of the country as viewed from the Ionian Sea on a clear day is very imposing; the mountains in all variety of forms, pyramidal, cut, and scarped in a greater or less degree, with bold slopes and well-defined outline, alter in appearance with every change of position.

Caution.—As the buoys marking the shoals in the Ionian Sea are often out of position and at times gone altogether and as the lights are in some cases defective, navigators are cautioned to be on their guard when in these (or in any other) waters.

The coast from Cape Linguetta to Port Palermo, a distance of about 32 miles, is almost inaccessible and mostly precipitous. It is the sea front of a high range of serrated mountains culminating in Mount Cika, 6,644 feet above the sea and only 3 miles inland. Along this extent of coast there are only two or three small coves, but no shelter whatever, and it is and ever has been dreaded as a lee shore by small sailing craft, southwesterly gales blowing directly on it; the current, however, sets almost constantly northwestward along the land.

Strade Bianche is an excellent landmark; it is a remarkably conspicuous white watercourse or sandy bed of a great torrent which, descending from the Cika Mountains at a steep inclination, presents the appearance many miles seaward of a broad white path, hence the name. It approaches the sea about 3 miles southwestward of Mount Cika, which with Kiore, another almost equally high peak

just northwestward of it, is visible in clear weather from a distance of 75 miles.

Port Palermo, ancient Panormus (lat $40^{\circ} 3' N.$, long. $19^{\circ} 48' E.$), is a bay with two arms on the western side of a high ridge of land projecting southward more than $\frac{1}{2}$ mile and sloping gradually toward Kavadoni Point, its extremity; it is sheltered on the southeastern side by an elevated peninsula terminating in Palermo Point, and is open southwestward.

The bay is divided by a point facing the entrance, on which is **San Nicolo Fort**, with a few houses in the rear. The northern part, **Armarada Bay**, has depths of from 15 to 35 fathoms, muddy bottom, and is sheltered against all but southwesterly winds. The southeastern part, **Cala Kaka**, which contains **Panorma** and **Sinikol Coves**, has rather less depth.

The prevailing wind should be considered in the choice of one of these anchorages; the shelter is good, but the bottom deepens so rapidly offshore that anchors often drag in the bora which frequently blows here in the winter. The bottom is rocky in various parts of the bay.

There is no difficulty in distinguishing Palermo. Its position with reference to Corfu and Merlera Island, and to the high land 3 miles eastward of the port on which stands **Fort Borsi** or **Bhars**, a ruin overlooking **St. Demetrio Church**, are ample indications. Near **Fort Borsi** is the small town of **Kiaparo**, containing about 400 houses, a minaret, and surrounded by a ruined wall; its inhabitants are mostly Turks. The shore on the eastern side of the entrance should not be too closely approached, as it is skirted by one or two rocks awash.

Georgantas Shoal, about 200 feet long northeast and southwest and 20 feet broad, with $1\frac{1}{4}$ fathoms water, lies about $\frac{1}{2}$ mile offshore, with **Lukovo Chapel**, which is situated $5\frac{1}{2}$ miles southward of **Fort Borsi**, bearing 47° , distant $1\frac{1}{2}$ miles.

Supplies.—Beef and mutton may be readily obtained, but vessels seldom touch here. It is through this port that the produce of the high lands are exported; olives, maize, gallnuts, and wood are exchanged chiefly for arms.

Cape Kiephali (lat. $39^{\circ} 54' N.$, long. $19^{\circ} 55' E.$).—Eastward of **Port Palermo** is **Grava** or **St. Demetrio Bay**, with the little church of the latter name, overlooked by the ruins of **Fort Borsi** as just described. **Cape Kiephali**, about $10\frac{1}{2}$ miles southeastward from **Port Palermo**, is a round projecting headland 489 feet high, covered with stunted trees and bushes; it is steep-to. There is nothing remarkable about the intervening coast which recedes, forming an indentation about 2 miles deep. The water all along is deep at a short $\frac{1}{2}$ mile from the shore, which is backed by high mountainous land.

Santa Quaranta Bay, about 5 miles southeastward of Cape Kiephali and 4 miles northeastward of the entrance to the North Channel, Corfu, is about 1.7 miles wide and recedes 1,400 yards. It is sheltered from all but westerly winds, to which it is quite open, and is capacious and fit for vessels of any size.

Large vessels anchor near the middle, in depths of from 15 to 17 fathoms, mud and sand; small craft find shelter in the northern part nearly abreast some dwellings not far from the customhouse, which is near the beach and the ruins of an extensive fortress. The village of Lykursi on a high conical hill facing the center of the bay is very conspicuous.

There is a stone pier with deep water alongside on the shoal of the bay.

Quaranta Rock, a shoal about 700 yards in length east and west, with 1 to 2 fathoms water upon it and steep-to, lies $\frac{1}{4}$ mile southward of the northern point of the bay; and more than a mile 286° from this point there is a 7-fathom patch, with depths of 22 fathoms between it and the land.

Santa Quaranta has regular postal communication with Janina, and with Corfu by the Austrian Lloyd's steamers.

Directions.—Cape Kiephali is a guide to the position of Santa Quaranta Bay. Vessels hugging the northern point of the bay in a northerly wind must beware of the rocky shoal lying off it. Vessels of less than 6 feet draft pass between the shoal and the point, keeping close to the latter.

Coast.—From Santa Quaranta Bay, the coast, generally rocky and bold, trends southward, and at the distance of about 3 miles is the monastery of St. Georgio standing on a pleasant-looking hill 354 feet high. The monastery is at the northwestern angle of Butrinto Lake, which is separated from the sea by an irregular piece of land from 600 yards to $2\frac{1}{2}$ miles in breadth. At $1\frac{1}{2}$ miles further on is a bay and in its southern part are the four small islets of Tetranisi. Vessels occasionally anchor on the southern side of these islets in a depth of 9 or 10 fathoms, sand; the shelter is very good in easterly or southerly winds, but the soundings are irregular.

Cape Scala (lat. $39^{\circ} 45' N.$, long. $19^{\circ} 59' E.$), is about $1\frac{1}{2}$ miles southwestward of the Tetranisi Islets; the land between is about 500 feet high, and, with the opposite coast of Corfu, forms the narrowest part of the North Channel of Corfu. From here the town of Corfu, with its magnificent surrounding panorama, may be seen.

Butrinto Bay, southward of Cape Scala, is about a mile wide and recedes nearly $\frac{3}{4}$ mile to a low broken shore.

There is anchorage in the bay in 14 to 16 fathoms water, stiff clay, with the point just southward of Cape Scala in line with Point San Stephano, 336° , and the customhouse, a building with a flagstaff

on a high spur open northward of the ruined fort of Votemi, in the middle of a marsh, 50°. This is considered the best anchorage on the coast, but caution must be used in its approach, as the water shoals suddenly from 12 fathoms.

Butrinto River Bar can only be crossed by boats.

The eastern extremity of Corfu should be kept open of the land about Cape Scala to avoid the mud bank off the Butrinto River; this bank extends some distance offshore all around the bay and is formed principally by deposit from the Katito River.

Butrinto Lake.—This fine sheet of water is $3\frac{1}{2}$ miles in length and about $1\frac{1}{2}$ miles in breadth, with depths of 10 to 12 feet all over it; the northern and southern shores are marshy, but the eastern and western shores rise in thickly wooded limestone hills, and from the northern end an extensive wooded plain extends to the foot of the high mountain range near Santa Quaranta. The lake abounds with fish, and toward the northern part the water is fresh; it communicates with the sea by the Butrinto River at the southwestern corner.

Another small fresh-water lake, named Rise, near the southeastern corner of the Butrinto Lake, communicates with it by a narrow canal and is supplied by copious springs.

After entering the Butrinto River, on the northern side is the salt-water Lake Almura, which is entered by a narrow channel opposite the ruins of Fort Votemi; the river here is about 20 yards wide, and $1\frac{1}{2}$ miles farther up on the northern bank, at the opening into Butrinto Lake, are the ruins of an extensive fort with several square towers standing on the summit of a rocky peak. An abundance of game is found in the neighborhood. Butrinto, Katito, and Livitazza are the best grounds for snipe, woodcock, and wild fowl of all kinds; Ftelia and Paganía for deer and wild boar.

Cape Stilo (lat. 39° 41' N., long. 20° 00' E.), 4 miles southward of Cape Scala, is low and salient, but the land about 2 miles within it rises to 883 feet in height; the coast between Butrinto Bay and the cape is high, with deep water close-to. The islet of Stilo, about 400 yards in circumference and 270 feet high, is about 200 yards from the shore southeastward of the cape, with 4 fathoms water between it and the shore.

Port Ftelia, a short mile eastward of Stilo Islet, is an irregular inlet open to the south and about 600 yards wide at the entrance. An islet lies on its western side, and within it, on the north, there is a depth of from 3 to 7 fathoms; eastward of the islet there is 11 fathoms. Small coasting craft occasionally seek shelter here, and either anchor northward of the islet or in the long creek extending eastward from it, in 9 or 10 fathoms.

Kotarto Rock, 600 yards in diameter, with 3 fathoms water, and from 26 to 34 fathoms around, lies nearly $\frac{3}{4}$ mile from the shore, 2.7

miles eastward of Stilo Islet, and $1\frac{1}{2}$ miles from the southern point of entrance to Paganía. The remarkable cone, 377 feet high, on the coast $1\frac{1}{2}$ miles southeastward of the southern extremity of Paganía Peninsula, kept open and bearing 110° leads southward of the shoal.

Paganía.—This little port is 5 miles east-southeastward of Cape Stilo; it is formed by a small peninsula 270 feet high projecting first at a right angle and then trending parallel with the coast, the sea face of this latter part being about $1\frac{1}{2}$ miles in length.

The entrance is open to the westward, 550 yards wide, with 26 fathoms water in mid-channel; the port runs in east-southeastward about 1,200 yards and then trends south-southwestward nearly 800 yards; this inner part is landlocked and upward of 200 yards wide, but narrowing close up to the head; it has from 5 to 3 fathoms water and from $1\frac{1}{2}$ to one fathom in the narrow part at the head. It is but little frequented except for sporting purposes, there being no fresh water and no village.

Vessels anchoring here should run hawsers to the shore, as the bottom, although mud, is not good.

There is a customhouse situated on the shore of a small bay $1\frac{1}{2}$ miles northwestward of Paganía North Cape.

Hilda Bay.—On the eastern side of Paganía Peninsula is a semi-circular bay open to the south, nearly $\frac{1}{2}$ mile deep and of the same width. On the western side of the bay are the two Hilda Islets. There is a depth of from 14 to 17 fathoms in the bay, and it is occasionally visited by small vessels.

Saiada Bay (lat. $39^\circ 37'$ N., long. $20^\circ 10'$ E.).—The remarkable cone before mentioned is the northern limit of Saiada Bay. Its southern limit is near the mouth of the northern branch of the Kalamo River, which enters the sea on the northern side of Mount Mavronoros, a forked mountain with its northern summit 1,675 feet high and less than a mile from the sea.

The bay is semicircular and open westward; it is about 2 miles wide, its northern coast high and southeastern coast low; the northern shore is bordered by a bank which increases in width round the southeastern side of the bay, where the shallow ground extending northward considerably contracts the area of deep water, the 5-fathom curve being only about $1\frac{1}{2}$ miles from the northern point.

In entering keep on the northern shore and anchor as convenient with the customhouse at the Scala bearing 89° in depths of from 12 to 4 fathoms, mud.

The village of Saiada is at the foot of the hills at the northeastern angle of the bay.

Supplies.—Excellent water may be obtained from a spring which runs into the sea a mile westward of the Scala or landing place.

Fresh meat can be had in small quantities but no vegetables. Trade is very limited.

Kalamo River—Bacchante Flats.—The Kalamo River, ancient Thyamis, empties itself by two mouths separating about $2\frac{1}{4}$ miles inland, one branch runs into the sea northward of Mount Mavronoros, the other by an irregular course round its eastern base $3\frac{1}{4}$ miles farther southward.

The Bacchante Flats are the continuation southward of the shallow bank bordering the low shore of Saiada Bay, and, fronting the mouths of the Kalamo and the base of Mount Mavronoros, they terminate at port Livitazza, of which they form the northern boundary. This bank extends into the Corfu Channel $2\frac{3}{4}$ miles from the shore under Mount Mavronoros and has evidently been formed by the mud and débris brought down by the Kalamo; the edge of the bank is steep-to, the water shoaling at places from 14 to 2 fathoms in a very short distance.

The white houses of Murzo village open of Prasudi Island 147° lead westward of the flats.

Livitazza Harbor.—The wooded peninsula of this name south-eastward of the Kalamo, is $1\frac{1}{2}$ miles in extent east and west, 286 feet high, and united to the mainland by a narrow sandy neck. Its northern side forms, with the shallow coast bank southward of the Kalamo, the port or harbor of Livitazza which is open to the west and runs in about a mile.

The entrance is somewhat deceptive and the interior appears larger than it really is, the northern shore being low and forming a deep bight northward, but the channel and available space is narrowed by the shoal water extending from that shore, and the channel is along by the high land of the peninsula, carrying from 7 to 11 fathoms water; it should be entered with great care and discretion. A vessel may anchor in depths of 11 to 9 fathoms good holding ground.

The port has three bays on the southern side, but in the center of the second (middle bay) is the best and almost land-locked anchorage in 9 fathoms, mud. Small craft load with firewood in the third or inner bay. A large extent of swampy ground, with two arid hills, exists on the north and east, preventing communication with the interior.

There is a great scarcity of fresh water, the River Kalamo being brackish for a considerable distance from its mouth.

Prasudi Island is oval in form, about 800 yards in extent, 100 feet high and covered with vegetation. It lies 1 mile westward of the southern extremity of the Livitazza Peninsula, and is a guide for the navigation of the Corfu Channel and a mark for clearing the

Bacchante Flats. A sunken rock lies close to its southwestern side, elsewhere it is nearly steep-to; between it and the peninsula there is a reef of rocks above water.

Port Gomenizza (lat. $39^{\circ} 29' N.$, long. $20^{\circ} 16' E.$).—Following the Livitazza Peninsula, the coast southeastward forms a fine sandy bay where the Turkish fleet occasionally used to anchor, in a depth of 7 or 8 fathoms, sand. In continuation of the neck of sand uniting Livitazza Peninsula with the mainland, the low sandy shore trends eastward to a tongue projecting 1,400 yards southward and terminating 3 miles eastward of Prasudi Island in Drepano Point, the northern point of entrance to Gomenizza.

At 1,400 yards southwestward of Drepano Point is the little islet of Aio Nisi, 74 feet high, close to the western extremity of a promontory 1,100 feet high which projects 2 miles in a northwesterly direction; a long $\frac{1}{2}$ mile within the islet is Cape Kudromurto, a wooded bluff and the northern extremity of the promontory.

The entrance to Gomenizza is between Aio Nisi Islet and Cape Kudromurto on the south and Drepano Point on the north, and is about 900 yards wide. Shallow water surrounds Drepano Point and extends across the entrance to Aio Nisi Islet, forming a sandy bar with only $2\frac{1}{4}$ fathoms in the best water.

Within the entrance the port opens out into a nearly oval basin about $2\frac{1}{2}$ miles in extent in a north and south direction and $1\frac{1}{4}$ miles wide. A large portion of the northwestern part is shallow, but the eastern and southern parts have depths of from 12 to 14 fathoms over a level mud bottom.

The village of Grava and the customhouse are on the eastern shore, a fortress in ruins stands on a hill in the rear, and to the southeastward is a fine cultivated plain. A few bullocks and sheep may be purchased and small quantities of fresh water can be procured from a well.

Directions.—To cross the bar, bring an isolated pinnacle peak 1,871 feet high, about $4\frac{1}{2}$ miles inland from Aio Nisi, on which Cape Kudromurto bearing 101° which mark leads over the bar; then keep along by Cape Kudromurto and the point within it and anchor off the customhouse in a depth of 9 to 14 fathoms, mud.

Coast—Plataria Bay on the southern side of the Aio Nisi promontory recedes nearly $3\frac{1}{2}$ miles to the village and low shore of the plain of Plataria, at its head. Its shores are rocky, but a cultivated valley extends southeastward between bold precipitous ridges.

The bay is open to the westward and the water deep, but two rocky patches lie in the center near its head having 5 and 3 fathoms water on them, the first rather more than one mile, the last $\frac{3}{4}$ mile from the beach, with deep water round them.

This bay is seldom resorted to as an anchorage, and is subject to heavy squalls during southerly gales.

Hieronisi Islet, 115 feet high, the southern entrance point, is almost connected with the extremity of the high land, the base of which forms the southern side of the bay; it bears 185° 2.7 miles from Aio Nisi Islet, the northern point.

Sivota Island, situated $2\frac{1}{2}$ miles south of Hieronisi Islet, is a mile in length northwest and southeast, rocky, 384 feet high, and thickly wooded. Between it and the coast in the vicinity of Cape Bianco, the southern extremity of Corfu Island is the entrance of the South Channel of Corfu which is 4 miles wide. From its dark color, Sivota is conspicuous and its light renders it important in the navigation of the channel at night; the water is deep $\frac{1}{2}$ mile from it.

Light.—From a lighthouse about 200 yards within the northwestern extremity of Sivota Island is exhibited at an elevation of 282 feet above the sea, a flashing white light, visible 20 miles. The light has been reported to be irregular; it is obscured by Cape Bianco.

Port Mourzo—San Nikolo Island (lat. 39° 24' N., long. 20° 15' E.).—Between Sivota and the mainland is the smaller island of San Nikolo 237 feet high, with its southern point united to Sivota by a reef of rock. San Nikolo is separated from the coast by a channel 400 to 600 yards wide and 1,400 yards in length, in the southeastern bend of which is the snug little port of Mourzo; the customhouse may be seen on the southeastern shore.

At the entrance of the port on the the northern side of San Nikolo Islet, there is a depth of 20 fathoms, diminishing rapidly within; the southern passage between the two islands of Sivota and San Nikolo on the one side, and the mainland on the other, has only 2 fathoms water. Small vessels visiting this port anchor in 4 fathoms near the house of the Aga or commandant and secure with hawsers to the shore.

Coal and supplies.—Water can be obtained from the spring near the village and provisions are cheap. The Turks have a depot of coal in the little channel which separates San Nikolo Island from the mainland, this being a port visited by their vessels of war.

Coast.—About 11 miles southeastward of Sivota Island is Cape Keladio, the western point of the port of Parga; the intervening coast rises in high rugged ridges partially wooded, the shore being rocky with a few small sandy bays, clear of danger, and the water all along is deep $\frac{1}{2}$ mile from the shore; it is backed by high mountainous land which, 1 mile within Cape Varlam, is 1,656 feet high. As the coast at night may become obscure a good look out should be kept.

Less than a mile southeastward of Sivota Island is a semicircular bay 1,200 yards wide and open southward; its eastern point is a con-

siderable projection from the coast and has sunken rocks around it; there is also a rock above water in the bay, within which there is a depth of 14 fathoms. About $1\frac{1}{2}$ miles beyond this bay is that of Arpizza, a small indentation in the land with two small islets or rocks close to the coast, one north of the bay, the other south of it, and about $\frac{1}{2}$ mile apart. A mile farther southward is Arilla Bay and beach, open to the west; between these two last bays, is a large isolated hill 1,104 feet above the sea; the village of Arilla stands on its southern side.

About a mile southward of Arilla is a small and unimportant bay with the little Paramythia River flowing into it; and about $1\frac{1}{2}$ miles farther on is a small islet or rock 100 yards from the shore on the narrow bank which borders the coast in this vicinity. The islet is just northward of Cape Varlam, the southwestern extremity of the curve of this steep coast but by no means a salient point. From this islet to Cape Keladio the coast is bold, steep-to, and the distance $4\frac{1}{2}$ miles.

Parga, ancient Toryne (lat. $39^{\circ} 16' N.$, long. $20^{\circ} 24' E.$), is a town containing about 5,000 inhabitants which, with its citadel (in ruins), stands on a conical rocky height 263 feet above the sea. The streets are narrow and dirty and the houses straggling. The adjacent country is fertile and produces an abundance of tobacco, fruit, olives, and tolerably good wine; in all of which an export trade is carried on.

The little port of Parga is divided into two bays by the projection on which the old citadel stands; one of these was anciently called "the port of Sweet Waters," afterwards Port Velike. The larger bay, westward of the citadel, is semicircular, with a sandy beach at its head, and the remains of an ancient mole on the southwestern side; it is about 600 yards wide and 600 yards deep, with from 6 to 7 fathoms water in the middle, and is open to the southward. The anchorage is in 7 fathoms, mud, about 250 yards southwestward of the citadel shore.

The other bay, southeastward of the citadel, is now considered to be the port and is protected from the sea by a chain of islets and rocks extending 800 yards southwestward from St. Anastasio Point, on which is a chapel, and on one of the islets is the lazaretto. This bay is nearly 200 yards wide at the entrance and 500 yards deep, with 5 to 8 fathoms, sandy bottom, and is open to the southwestward. Both of these bays are fit for small vessels only, and coasters usually prefer the eastern.

Cape Keladio, the western point of Port Parga, is steep and rugged, 173 feet high, and has on it a conspicuous square tower, being part of the ruins of the convent of St. Spiridione. On the western side of the point is a small islet, and on the eastern side, about 200 yards from the shore, is the Spiridione rocky ledge awash.

The entrance to the port is 500 yards wide between this rocky ledge and the Turkika Rocks, the outermost of the chain extending from St. Anastasio Point.

During fine summer weather vessels find temporary anchorage off Parga, outside the port, in about 20 fathoms, mud, 700 yards from the shore of the citadel, with Cape Keladio bearing 286° .

At 1.3 miles eastward of Cape Keladio is the islet of San Nikolo, 50 feet high, with a white chapel on its summit; it lies 400 yards from the shore at Pogogna Point, and in the space between there is a depth of 22 fathoms. At about 2 miles eastward of San Nikolo is the port of San Giovanni.

Port St. Giovanni, ancient Acherusia, open to the southward is about 1,400 yards in extent north and south by 1,000 yards in width, with a depth of 20 fathoms at the entrance, decreasing to 6 fathoms near the head. It is surrounded by high limestone hills and its north-eastern shore is skirted by rocks, but its sides all around may be closed to about 200 yards. Small vessels anchor in a depth of 8 or 9 fathoms off Skuluki Cove, in the northwestern corner of the bay, where they also moor, but the best anchorage with northerly winds is in 13 fathoms, mud, in the middle of the bay.

Within the western point of the bay, off the first cove, is a remarkable fresh-water spring, rising from a depth of 12 fathoms; halfway up the eastern shore, near a cultivated patch of ground, excellent water may be obtained.

Port Phanari, ancient Glycys (lat. $39^{\circ} 14' N.$, long. $20^{\circ} 30' E.$), is situated $1\frac{1}{2}$ miles southward of Port St. Giovanni, the coast between, consisting of high, red, rocky cliffs, being free from danger.

The entrance to Port Phanari is less than 300 yards wide and exposed to southwesterly winds; the interior opens out to the northward, is circular, and from 800 to 1,000 yards in diameter, but this expanse of water is deceptive, as a large portion of the port is silted up by the alluvium from the Gurla River, nearly the whole of the port westward from the sandy shore which borders it being shallow. The deep water extends only 300 yards from the western side of the port and about 800 yards along that shore, the deep space gradually becoming narrow and shallow toward the north.

The village of Phanari is on the eastern shore.

The northern point of entrance is 50 feet high; its sea face for nearly $\frac{1}{2}$ mile northward is skirted by sunken rocks, and one rock, 6 feet high, lies 470 yards from the southern extremity of the point and about 100 yards from the shore; another, a large gray rock, is close inshore about 200 yards from the point. The southern point of entrance is a tongue of land projecting northward, 75 feet high, with a chapel on its summit. The position of the port may be known from

seaward by the ruins of a castle on a hill, $2\frac{1}{2}$ miles 89° from the entrance; also by the cliffs on either hand being wedge-shaped.

The anchorage is in a depth of $5\frac{1}{2}$ fathoms about 300 yards 53° from the northern point of entrance and a scant 200 yards from the western shore; country vessels winter here, anchoring on the western shore and hauling close in to the rocks. There is also temporary anchorage in fine weather during summer 600 yards southwestward of the entrance, in 10 fathoms; outside this, the depth increases rapidly.

The Gurla River, ancient Acheron, runs into the southeastern part of the port and is a considerable stream; it has only 2 feet water on the bar, but boats can ascend some distance and drinking water may be obtained from it. The Vuvo, ancient Cocytus, flows into the Gurla from the northward about $2\frac{1}{2}$ miles from its mouth, passing round the southern end of the hill on which stands the ruined castle.

The stream generally runs out of Port Phanari at the rate of about $1\frac{1}{2}$ miles an hour, but it is much stronger during the rainy season.

Coast.—The valley in the interior is well cultivated, and visible some distance, the land on its southeastern side rising to 3,000 feet above the sea at Mount Zarothema, 7 miles from Phanari. The coast for some distance southward of Port Phanari is rocky, followed by sandy beaches separated by small points. At $8\frac{1}{2}$ miles southeastward of Phanari are the picturesque ruins of the castle of Riniassa, perched on a limestone rock about 535 feet above the sea; the castle has apparently been destroyed by an earthquake splitting the entire hill apart, leaving a deep perpendicular chasm dividing the fortress longitudinally. At 3 miles farther on, is Kastrosikia Point, with the town of the same name a long $\frac{1}{2}$ mile northeastward of it. From 2 miles southward of Phanari, the shore is bordered by a bank having 1 to 4 fathoms water at 400 to 1,200 yards from it.

Kastrosikia Point (lat. $39^\circ 5' N.$, long. $20^\circ 39' E.$), is a slightly projecting low red bluff, the termination of the southern slope of Mount Zarothema, with a beach on either side; it is the northern extremity of Gomaros Bay. The point is surrounded, at the distance of about 1,400 yards, by a rocky shoal, terminating southwestward in the Ittisa Reef, with about 4 feet water. About $\frac{3}{4}$ mile northwestward of the point, and $\frac{1}{2}$ mile from the shore, is a rock awash.

As the shoals surrounding Kastrosikia Point are steep-to, it should have a wide berth; the soundings are irregular, and there is a depth of 9 or 10 fathoms close to the reefs.

Gomaros Bay is the indentation in the shore between Kastrosikia Point and Mytika Bluff, about 6 miles southward of it; within this line the bay recedes barely $1\frac{1}{2}$ miles, the shore throughout being a

sandy beach through which several streams of fresh water run into the sea, with a chain of hills 1 mile inland.

Near the middle of the bay is the village of Kanali, and over the southern part of the bay is Mount Mikalitzza, 520 feet high, with a building on its summit; below and southwestward of it are the remains of an ancient mole projecting 400 yards from the shore. Southward of Mount Mikalitzza the Romans made a canal to unite the Gulf of Arta (Ambrakikos) with the Ionian Sea; the isthmus now dividing them at this spot is about 1.7 miles wide. The ruins of the ancient Nicopolis are here scattered over the ground.

Northward of Mount Mikalitzza the bay affords anchorage with offshore winds in a depth of 10 or 11 fathoms at $\frac{1}{2}$ mile from the shore; farther off the depth increases rapidly. From about 1 mile northward of the ancient mole the beach southward to Mytika Bluff is bordered by a bank with 5 fathoms water, extending in places nearly 1 mile offshore.

Small coasting vessels load with the produce of the country in the northern corner of the bay, where there is a customhouse, sheltered from the westward by the Ittisa Reef.

Mytika Bluff, the southern point of Gomaros Bay, has on its eastern side a small cove near the village of Mytika. At 600 yards northward of the bluff, and rather more than this distance from the beach, is a rock awash. Mytika Bluff is clifty, surrounded by shallow rocky ground, and at 1,600 yards westward of it there is but $3\frac{1}{2}$ fathoms water; the bank is steep-to, and 1,000 yards beyond this the depth is 30 fathoms.

Between the bluff and Fort Pantakratora on the northern side of the entrance to Prevesa Strait, $3\frac{1}{2}$ miles farther southward, the land is thickly covered with olive trees; the coast is clifty, with a sandy beach, and is skirted by a continuous chain of rocks extending $\frac{1}{2}$ mile off the bluff, but not so far southward. The whole of this part of the coast, between the parallel of Mount Mikalitzza and Prevesa Strait, should have a wide berth, and attention should be given to the lead when near it.

The Gulf of Arta is described elsewhere.

Corfu Island—General remarks.—Corfu, ancient Kerkyra, the most important of the Ionian Islands, may be considered the key of the Adriatic, and from its position has had a checkered political existence; it was formerly a much-prized Venetian possession. Corfu was occupied during the wars of the latter part of the 18th century and early part of the last century by different belligerents in succession; next assigned as one of the islands of the Ionian Republic to British protection by the treaty of Vienna; and finally, with all the other islands of the republic, incorporated with the Kingdom of Greece in the year 1864.

The island is about 33 miles in length northwest and southeast, with an irregular coast line, the northern portion of the island being $15\frac{1}{2}$ miles in breadth east and west, but at 7 miles from its northern extremity suddenly contracting to less than 6 miles; southward of the town of Corfu, to about 5 miles; and at the head of Lefkimo Bay, 6 miles from its southeastern extremity, to 2 miles; its total area is about 200 square nautical miles.

In general, the island is mountainous and covered throughout with olive plantations. Mount San Salvador, the highest part of the northern ridge, has two remarkable conical peaks 3,000 feet above the sea, with flat table land between them; its sides are precipitous, thickly wooded, and cut up with deep ravines and watercourses. On the western side of the island and farther southward, Mount San Giorgio rises 1,288 feet high, close to the sea; and beyond it, Mount Santa Decca 1,859 feet.

The population of the island by the census of 1907, including adjacent small islets, was 94,451.

Trade.—The principal exports are oil, olives, wine, and soap; the imports are cereals, coal, cotton, and other manufactures; iron, tin, and hardware, principally from Great Britain; sugar, coffee, rice, etc.; it produces excellent fruit and vegetables, and a small quantity of corn. Provisions of all kinds are easily procured.

Communication—Telegraph cables.—There is weekly communication with almost all parts of the Mediterranean by means of Austrian, Italian, and Greek steamers, and the island is in telegraphic communication with the Continent by means of the Eastern Telegraph Co.'s system, and with the other Ionian Islands by Greek Government cables. That from Trieste passes through the north channel and is landed at the town of Corfu. The cable from Otranto is landed near Sidari in the northern end of the island, while those connecting with Paxo and with Santa Maura leave the shore just westward of Cape Bianco.

Time.—Athens time is kept at Corfu; see Chapter I.

Cape Santa Katerina (lat. $39^{\circ} 49' N.$, long. $19^{\circ} 52' E.$), the northern point of Corfu, is somewhat low, but easily distinguished by the church on its summit about 200 feet high. It lies nearly 6 miles southwestward from Cape Kiephali of Epirus, and between these points is the entrance to the North Channel of Corfu.

Aprau Bay.—Rather less than $1\frac{1}{2}$ miles southeastward of Cape Santa Katerina is Spiridione Point, the water being shoal nearly $\frac{1}{2}$ mile off between them. Following Spiridione Point $2\frac{1}{4}$ miles farther on is Cassopo Point, on which are the ruins of a Venetian fortress; the intermediate coast forms the Bay of Aprau, where there is anchorage with offshore winds in depths of 11 to 19 fathoms. On the

southwestern side of Cassopo Point is the little port of Cassopetto, with 4 fathoms water. These places are seldom resorted to but by fishermen.

Bolana Bay.—After passing Cassopo Point, 1 mile farther south-eastward, is Barbara Point and between them is Bolana Bay, oval in form, 800 yards wide, and 1,200 yards deep, with a depth of 8 to 15 fathoms. This bay affords shelter from southerly winds, but is quite open northward and seldom used except by fishermen.

A bank about 300 yards in extent, with a depth of 7 fathoms and steep-to, is situated at a distance of 450 yards 331° from Barbara Point.

Tignoso Islet.—This little islet lies 1,600 yards eastward from Barbara Point; it resembles a number of whitish stones irregularly placed one upon the other, and is crowned by a circular white lighthouse and a few small trees.

At 400 yards northward of Tignoso is a small rock above water, and the two are united by a tongue of shallow ground. This rock has occasionally been reported as nonexistent. No doubt it is at times under water, the North Channel to Corfu being peculiarly subject to fluctuations in depth, according to the direction of the wind. See remarks on this subject in Chapter I.

Nearly $\frac{1}{2}$ mile eastward of Tignoso is the Barchetta, a rock only a few feet above the water, and so named from its resemblance to a boat; it is steep-to, and with a depth of 19 fathoms between it and the islet.

About 400 yards northward of the Barchetta is a rock with 6 feet water.

Eastward of the Barchetta, and westward of Tignoso, the channels are clear.

Light.—From the lighthouse (a white circular tower) on Tignoso Islet, 55 feet in height, is exhibited, at an elevation of 100 feet above the sea, a fixed white light, varied by a red flash, visible 14 miles.

From Barbara Point, the coast trends southeastward about 1 mile to San Stefano Point, which is moderately high, and is the eastern extremity of Corfu at its northern end; a flat rock extends out from a point south of Barbara Point, and northward of San Stefano Point are some sunken rocks near the shore. About $\frac{1}{2}$ mile southwestward of San Stefano Point are (or were) the ruins of a mill on a hill 396 feet high.

Serpa Rocks, just awash, lie about 600 yards from the southern point of the small bay under the hill 396 feet high, south of San Stefano Point. These rocks are steep-to, having deep water on their eastern side, and contract the width of the channel between them and the coast of Albania to rather less than 1 mile. In calm weather they are seen by their reddish color in contrast with the blue water.

At night vessels should keep well over on the Albanian shore.

Port San Stefano is a small bay southward of the hill above mentioned, open to the south, with about $2\frac{1}{2}$ fathoms water in the middle; it is fit only for small coasters.

Port Karagol is another small bay open to the eastward, fit only for boats; it has a little mole and a chapel near it.

Tpsa Bay.—From Karagol Point, $1\frac{1}{2}$ miles southward of San Stefano Point, the coast trends westward along the base of the steep craggy slopes of Mount San Salvador and is bold and steep-to; at $5\frac{1}{2}$ miles from Karagol Point is the head of Tpsa Bay, from whence the shore trends at first southward and then eastward to the town of Corfu. The land is thickly covered with olive trees.

Vessels occasionally anchor in Tpsa Bay in depths of from 7 to 10 fathoms, mud.

Port Govino.—About $3\frac{1}{2}$ miles northwestward of the town of Corfu is the well sheltered port of Govino, a mile deep, but narrow, owing to the accumulation of mud on both shores. It is surrounded by marshes which cause fevers, and, in consequence, is now seldom used as a port. Here the Venetians had their arsenal, and its ruins are still visible along the western shore. It has depths of 4 to $4\frac{1}{2}$ fathoms, but the mudbanks which contract the deep water surround both points of entrance.

Comeni Head, a small round promontory 130 feet high with a small islet on its southern side, lies about 2 miles southward of Tpsa Bay, and is on the northern side of the entrance to the port.

Corfu Town, ancient Kerkyra, on the eastern side of the island and standing picturesquely on a promontory, washed on either side by the sea, and terminating in Cape Sidero, was formerly a place of considerable strength. These forts were dismantled when the islands were ceded to Greece in 1864. On the eastern part of the promontory is the citadel, separated from the town by a ditch or fosse with 7 or 8 feet water, built on a rugged precipitous rock with its summit split into two peaks, each crowned by a battery; on the western and highest peak is the lighthouse and signal station. At the northeastern extremity is the Flagstaff bastion.

The town is surrounded by fortifications; Fort Neuf, built by the Venetians, forms the northwestern extremity. On the eastern face of the town is the Government house and a fine esplanade and parade ground, laid out with walks and avenues of trees and commanding a magnificent view. The streets of the town are narrow but clean; there are several churches, a theater, and hotels. The sanita or health office and customhouse are on the northern face of the town. In the ditch, on the western side of the citadel, is the principal landing place, from whence a flight of steps leads up to the esplanade.

The church, situated about 400 yards west-southwestward of Point San Nicolo, has a white tower, with a red roof; it is not conspicuous from the anchorage.

About 70 yards eastward of the church just mentioned is a white tower with a large red dome and gallery.

A high white stone chimney, with factory buildings attached, is situated at Kefalo mandukio, to the westward of Corfu town.

An admirable Strada marina runs round Kastrades Bay southward of the citadel and is a much frequented public drive and promenade. The neighborhood is adorned with gardens, country houses, olive grounds, and vineyards. Excellent roads in every direction lead through extensive plains of rich, well-cultivated land to the numerous villages, many of which are on the sides of steep well-wooded ridges, commanding scenery not to be surpassed for grandeur and beauty in any part of the world.

Population.—The town, including the suburbs of Mandukio on the west and Kastardes on the south, contained 29,135 inhabitants in 1895.

Breakwater.—A breakwater has been proposed off Mandukio, just westward of the town, and a breakwater partly built extends westward from the health office; the inclosed space is shallow, apparently.

On the northern face of the citadel is a camber in which small vessels lie in 6 feet water; a gate at its southeastern angle leads up into the citadel.

Coal and supplies.—Corfu affords resources of all kinds.

Coal is supplied by lighter to vessels in the road; from 3,000 to 4,000 tons are usually in stock. There are two coal wharfs, 80 feet and 60 feet in length, with a depth of 7 feet alongside them.

Provisions are abundant, and a copious supply of water has been brought in pipes from a source above the village of Benizza, a distance of 7 miles, and may be procured near the health office on the northern side of the town. Vessels of war are supplied with water from a pipe leading down to the ditch of the citadel, or it can be obtained from contractor in tanks having a capacity of about 7 tons. In summer, if the water gets scarce, it is procured from Butrinto on the mainland.

Repairs.—There are shipyards where small repairs can be executed, but no docks of any description.

Light.—From a circular white lighthouse 33 feet high in the citadel, at an elevation of 245 feet above the sea a fixed white light is exhibited, visible 16 miles. A light is shown from a post at the entrance to the Citadel Moat.

A small fixed red light is also shown in the harbor at the mole head near the health office.

Corfu Road extends along the northern face of the town and is sheltered by the island of Vido from the strong northeasterly winds which blow with violence during the winter months; it affords anchorage over an area about 2 miles in length and $\frac{1}{2}$ mile in breadth, in depths of from 10 to 16 fathoms, stiff mud and clay.

The best berth for a vessel of war is about mid-channel, with cape Scala, near Butrinto on the Albanian shore, shut in with the eastern extremity of Vido; small vessels moor off the camber under the citadel.

Merchant vessels anchor off the health office and customhouse, in 5 to 10 fathoms, but vessels in quarantine are sent to Lazaretto Island, off the entrance of Port Govino, where they lie until they receive pratique.

It has been proposed to construct a breakwater to project in an easterly direction from Kefalo-mandukio, at Mount Olivet, as previously mentioned.

There is a fixed crane at the customhouse quay, capable of lifting weights up to 4 tons, and two smaller 2-ton cranes.

Mooring buoy.—A white mooring buoy has been placed near Point San Nikolo. Permission must be obtained for a vessel to moor to the buoy for more than six hours from the captain of the port, and the buoy must be vacated at his request.

Signal station.—There is a signal station at the citadel.

Vido Island, 142 feet high, of triangular form, extending somewhat more than $\frac{1}{2}$ mile east and west, is $\frac{1}{2}$ mile wide at its eastern side; it is nearly steep to except on its northern side, where there are some outlying rocks 200 yards from the shore.

Light.—A light is exhibited from the pier at the landing place on Vido Island when the steam ferry boat is running.

Shoals.—Nearly 800 yards westward of Vido is the small rocky islet Calovero, 30 feet high and surrounded by shoal water; a rocky $4\frac{1}{2}$ -fathom patch lies 106° of the islet and midway between it and Vido; there is another patch, with $4\frac{3}{4}$ fathoms, 650 yards 50° of Calovero.

The passage between the islet and Vido should be taken only by small vessels.

Quarantine—Lazaretto Island, the quarantine establishment, is $1\frac{1}{2}$ miles westward of Calovero Islet; it is 68 feet high and about 400 yards in length. Vessels in quarantine anchor in a depth of 13 fathoms about 600 yards southward of the Lazaretto.

Vessels bound for any port in Greece and arriving from infected ports have to present themselves either at this port, at Trisonia near Patras, or at Delos.

Kastrades Bay.—Cape Sidero, the eastern extremity of the rocky mass on which the citadel of Corfu stands, is the northern point of

Kastrades Bay. This bay is about $\frac{3}{4}$ mile in extent, shallow, and used only by fishing boats; along the shore is the *Strada marina*, already described.

A promontory projecting southward from Kastrades Bay and terminating in One Gun Point, covers Lake Kalikiopulo, at the mouth of which is the picturesque little islet of Ulysses, 64 feet high, with a chapel on it and once connected with the mainland by a causeway. The lake is shallow and silting up.

Benizza.—At $2\frac{1}{4}$ miles southward of Ulysses Islet is the village of Benizza, under the sharp peaks of Mounts Santa Decca and Santa Croce, the former 1,859 feet high and the highest land in the southern part of Corfu; the latter 1,476 feet high. Near the village are the springs which supply the town of Corfu with water. Vessels occasionally anchor off the village in a depth of 9 fathoms. The land from the northward is undulating and thickly wooded.

The coast from Benizza trends southward and eastward about 7 miles to Buccari Point. The village of Mirangi is on the beach in the bend of the coast, southward of stream of water. Vessels occasionally anchor here in depths of 8 or 9 fathoms, sand. The land here rises in thickly wooded ridges toward the peaks of Santa Croce and Santa Decca.

Buccari Point, 3 miles from Mirangi, is rounded and 274 feet high; the intermediate shore is low. Under this point there is anchorage in 10 fathoms, sand.

Lefkimo Point, ancient Levkimni (lat. $39^{\circ} 27' N.$, long. $20^{\circ} 05' E.$), $3\frac{1}{2}$ miles eastward from Buccari Point, is a long tongue of sand projecting northeastward with shallow water extending about $\frac{1}{2}$ mile beyond it. The low shore between the two points forms Lefkimo Bay, which is $1\frac{1}{2}$ miles deep and has a depth of 16 fathoms in the middle; the shore round the bay is bordered at a shore distance by shallow water. A mile southwestward of the point are the Salternes of Lefkimo.

Lights.—On Lefkimo Point, from a metal pillar over an iron shed, a fixed red light is exhibited at an elevation of 20 feet above the sea, visible 2 miles.

A small fixed white light, elevated 17 feet above the sea, visible 3 miles, is shown occasionally from an iron column on the center of the pier on the southern side of the Potami River, about $1\frac{1}{4}$ miles southward of Lefkimo Point.

Anchorage.—Excellent anchorage will be found in Lefkimo Bay in a depth of 15 to 17 fathoms. A good berth for a large vessel is with Sivota Lighthouse and a storehouse at Salternes in line 110° , and Lefkimo Point Light bearing 82° . Caution is necessary in rounding the spit extending from Lefkimo Point.

Clearing mark.—In steering for Corfu Road by the South Channel, the western peak of Mount San Salvador in line with the center of Vido Island 324° , leads eastward of all shoal water off Lefkimo Point.

Cape Bianco (lat. $39^{\circ} 21' N.$, long. $20^{\circ} 08' E.$), the southern extremity of the island of Corfu, is 6 miles southward of Lefkimo Point; the intervening shore is low and bordered at the distance of from $\frac{1}{2}$ to $\frac{3}{4}$ mile by shallow water interspersed with rocks.

There is anchorage with westerly winds in depths of 10 to 12 fathoms, sand, all along the coast until within about 2 miles of the cape, which is about 330 feet high, and a hill $1\frac{1}{2}$ miles northwestward of it is 481 feet high. Cape Bianco is composed of white cliffs resembling those of Beachy Head on the southern coast of England.

Telegraph cables.—The cables connecting Corfu with Paxo and with Santa Maura leave the shore a short distance westward of Cape Bianco.

Bianco Shoal.—Cape Bianco is surrounded by a sandy shoal extending southward about 2 miles, and in a southeasterly direction, about the same distance from the cape. This shoal should be approached with caution and not rounded too closely, as the depths over it are very irregular.

Corfu Citadel, well open westward of Mount San Salvador, 324° , leads eastward of the shoal.

West Coast—Maga Khoro Point, $5\frac{1}{4}$ miles northwestward of Cape Bianco, is low and, like the intervening shore, is foul and rocky. At 1,600 yards 232° from the point is a rocky 1-fathom patch; and $\frac{1}{2}$ mile southward of the patch is a rocky bank with 8 fathoms, the water quickly deepening outside it to 20 fathoms.

Lagudia Rocks.—These two flat rocky islets are a mile southwestward of Konsia Point; a sunken reef lies nearly $\frac{3}{4}$ mile southeastward of the rocks.

Konsia Point, $4\frac{1}{2}$ miles beyond Maga Khoro Point, is low with shallow water extending nearly $\frac{3}{4}$ mile off it, and the depth between this shoal and the Lagudia Rocks is from 4 to 5 fathoms.

Vessels frequently anchor all along this coast as far as Cape Bianco in a depth of 9 to 10 fathoms, fine sand, sheltered against the strong northeasterly winter gales which blow with violence.

Coast.—Between Konsia and Kardiki Points, about $2\frac{1}{2}$ miles apart, the coast is low and sandy, and within it is the shallow salt water lake of Corissa, 3 miles in length and $\frac{1}{2}$ mile in breadth. From Kardiki Point, the coast trends northward about $4\frac{1}{2}$ miles as far as Cape Faskia and is the base of the Paviliana and Garuna Mountains, the land ranging 1,440 and 1,530 feet high less than $\frac{1}{2}$ mile within the coast line.

Rocks.—Northward of the Lagudia Rocks, the coast, which forms an outward curve, is studded with off-lying rocks and rocky patches having from 2 to 3 fathoms water on them and nearly steep-to. The Bragonitica Shoal, the outer danger, lies $1\frac{1}{2}$ miles 202° from Kardiki Point and 303° $2\frac{1}{2}$ miles from the outer Lagudia Rock. These dangers should be given a wide berth.

The little islet of Tholetho with a rock above water close to it, just northward of Cape Faskia, has on its western side the little port of Nicolo di Mitika, 400 yards wide, which is visited by small coasters. The shore to the northward is at first a sandy beach, which is followed by an irregular rugged coast, the land immediately within being from 785 to 893 feet high.

Gordi Islets or rocks are about $2\frac{1}{2}$ miles northward of Tholetho Islet and 600 yards from the shore, with 5 fathoms inside and deep water $\frac{1}{2}$ mile outside them.

San Giorgio Point (lat. $39^{\circ} 35' N.$, long. $19^{\circ} 47' E.$), $2\frac{1}{2}$ miles northward of Gordi Rocks, is at the foot of Mount San Giorgio, a high, round, steep promontory 1,288 feet above the sea; its coast line is irregular, rugged, steep, and rocky. A small stream after watering a fertile valley runs into Ermones Bay northward of Mount San Giorgio, the latter at a distance appearing isolated.

Plakka Point, $1\frac{1}{2}$ miles northwestward of San Giorgio Point, is high and slightly projecting, with a depth of 50 fathoms close-to; 3 miles farther on is the entrance to Liapades Bay; the intermediate coast is skirted close inshore with rocks here and there and is precipitous, the land within rising in high, bold ridges.

The little islet of Koliviri, 200 yards in diameter and steep-to, lies 1 mile northwestward of Plakka Point and $\frac{1}{2}$ mile from the cliffs.

Liapades Bay recedes northeastward upward of 1 mile and affords shelter with northerly and easterly winds, and vessels occasionally anchor in a depth of about 10 fathoms, fine sand.

Alipa and St. Spiridione.—From the head of Liapades Bay, the high and cliffy coast trends westward $2\frac{1}{2}$ miles to Cape Palacrum, the two ports of Alipa and St. Spiridione, little coves open to the southward and only fit for coasting craft and fishing-boats, lying within this space. At a short distance from the coast the water is deep. During strong northwesterly winds, the squalls from the land are very heavy.

Cape Palacrum rises from the sea in bold precipitous cliffs and is easily known by the picturesque ruins of the castle of St. Angelo, a Venetian fortress, standing on one of its rugged crags eastward of the cape and 1,081 feet above the sea.

St. Georges Bay.—Cape Arilla, 2 miles northward of Cape Palacrum, is round and bold, about 390 feet high, and is the termination of a tongue of land projecting nearly a mile southwestward and form-

ing the western side of St. Georges Bay. At the head of the bay is a fine sandy beach; and, in the northern corner, there is good summer anchorage in depths of 6 to 9 fathoms, sand, but being exposed to southwesterly winds it is seldom resorted to. Immediately northward of Cape Arilla is Port Timone, a small bay fit for boats only.

Cape Kephali, about $2\frac{1}{4}$ miles northward of Cape Arilla, is the western extremity of the island of Corfu and is a low tongue projecting westward, the land within rising in peaked hillocks; the intervening shore forms a shallow rocky bay, the first part of the coast being cliffy and followed by a fine sandy beach. Off the center of the bay, nearly $1\frac{1}{4}$ miles from the shore, is the islet of Kravia, 218 feet high, about 800 yards in length north and south, with two small islets or rocks at its northern end, and a sunken rock close to its southern end. In case of necessity, a vessel might anchor with westerly winds on the eastern side of this islet.

Cape Drasti (lat. $39^{\circ} 47' N.$, long. $19^{\circ} 41' E.$), $3\frac{1}{4}$ miles northeastward from Cape Kephali, is a low white chalky projection surrounded by a shoal extending 800 yards northward of it with 2 to 3 fathoms water. The coast between the two capes, except close to Cape Kephali, is composed of steep chalky cliffs bordered by shallow water; and, about midway, is a bank nearly a mile from the shore with from 2 to 3 fathoms water.

North Coast—Sidari and San Giorgio Bays.—From Cape Drasti, the coast, generally low and sandy, trends eastward for 8 miles to Cape Santa Katerina, the northern extremity of Corfu, curving slightly southward, and forming the sandy bays of Sidari and San Giorgio, separated from each other $3\frac{1}{4}$ miles eastward of Cape Drasti by Astrakari Point, easily known by its white cliffs; the shore throughout is bordered by shallow water and rocks. The thickly wooded slopes of the high land within have, at their bases, highly cultivated ground and small fertile plains.

Vessels frequently anchor in both Sidari and San Giorgio Bays, but the telegraph cable from Otranto is landed in this vicinity. From Sidari, communication with the town of Corfu is easy by a good carriage road; fresh water may be procured from a stream eastward of the village of Sidari, standing near the beach.

Astrakari Shoal.—Nearly $1\frac{1}{4}$ miles northward from Astrakari Point is this rocky shoal, with one fathom water; and, about 600 yards farther northwestward, is another shoal with 4 fathoms.

The northern point of Diaplo Islet, open of Cape Drasti 245° leads northward of these dangers; San Giorgio Monastery, near the northwestern corner of the lake of Butrinto on the mainland, open of Cape Santa Katerina 98° , also leads northward of the shoals.

Diaplo Islet is nearly 1,350 yards in length north and south, 152 feet high, cliffy, and surrounded by rocks; its southern end bears 294°

1½ miles from Cape Kephali. About ½ mile eastward of the southern part is a rock with 1 fathom water and steep-to all round.

Diakopo Islet, 101 feet high, adjoining the southwestern side of Diaplo, is also cliffy, about 100 yards from its western end there is a flat reef.

Karavi or Ship Rock, about 1,600 yards westward of Diakopo, is about 98 feet high and steep-to. About 200 yards southeastward of Karavi is another large rock or islet; and 1,600 yards farther southward is Plakka Islet, 4 feet high, but bold.

The current amongst these islets and also between them and the mainland of Corfu is occasionally strong.

Samothraki Island (lat. 39° 46' N., long. 19° 32' E.) is 2 miles in length north-northwest and south-southeast, its average breadth about ½ mile, 500 feet high, and skirted all round by rocks. It is but sparsely inhabited.

Nearly midway between its southeastern extremity and Karavi Islet is a rocky 1-fathom patch, with a depth of 7 fathoms on either side of it. A shoal extends a mile southwestward of the southwest point of the island and at its extremity is the little islet of Platia. Southeastward of Platia, distant 800 yards, is a shoal extending nearly 800 yards farther in that direction with 2 fathoms water.

Trachia, a small islet 92 feet high, lies about ¾ mile off the western side of Samothraki and ½ mile northward of this islet is a rock above water. Another rock above water lies ½ mile northwestward of Saki Point, the northern end of Samothraki; and nearly 1½ miles 287° from Saki Point is a rocky 2-fathoms patch.

Vessels passing between Fano and Samothraki should keep nearer the former island to avoid the rocky 2-fathoms patch just mentioned.

Fano Island, ancient Othomi (lat. 39° 51' N., long. 19° 24' E.), is the largest of the islands off the northwestern part of Corfu, from which its southeastern side is distant 11½ miles; Bocha Point, its northwestern extremity, lies 47 miles eastward of Cape Santa Maria di Leuca, Italy. The island is 3 miles in length east and west, and from its western side, which is 2 miles in extent, its length decreases eastward. Its greatest height is at the southwestern part, which is 1,339 feet above the sea, and at its northwestern end it attains a height of 1,034 feet; it is covered with pine trees, and, owing to the height of its extremity, appears forked when viewed from the westward. The western side is precipitous and from thence it slopes eastward. The island rises from the outer extremity of the bank extending northwestward from Corfu, and the 100-fathom curve passes only about 1,200 or 1,400 yards westward of its western side.

Fano is skirted by rocks and shallow patches. A small bay on the southern side affords shelter to a few coasting craft of the islands against the strong northwesterly summer breezes.

Osprey Rock, with one fathom water and steep-to, lies about $\frac{1}{2}$ mile 145° from the western point of the bay.

Shoals.—**Kastri Point**, the eastern extremity of the island, is 324 feet high, and has on it the remains of a Venetian fortress. Two dangerous rocky shoals lie near the point; one, of some length, with 1 fathom on its southern head and 6 or 7 fathoms around it, lies $\frac{3}{4}$ mile 67° from the point; the other, with 2 fathoms, lies nearly 174° $\frac{1}{2}$ mile from the point. Many other rocks and shoals lie nearer the shore, and when in this vicinity caution is necessary with reference to these dangers. Vessels frequently anchor in the sandy bay between Kastri and Avlaki points.

Fano contains about 1,000 inhabitants, besides a small detachment of soldiers; the former are principally seafaring men who carry on a small trade along the neighboring coasts. Provisions of all kinds are brought from Corfu, but the coast abounds with fish, and at certain seasons quail are plentiful on the island. Fresh water may be obtained in small quantities from a well in Avlaki Bay.

Light.—On Kastri Point, at 360 yards from its extremity, is a round white tower 46 feet high, from which is exhibited, at an elevation of 346 feet above the sea, a fixed white light varied by a red flash, visible 25 miles. The light is obscured from the westward by the high land of the island. Reported to be visible only 15 miles, 1894.

Merlera, the most northern of the group of islands northwestward of Corfu, is $6\frac{1}{2}$ miles eastward of Fano; the passage between them, with the exception of the shoals off Kastri Point, being clear of danger. The island is $1\frac{1}{2}$ miles in length north and south, nearly as wide, and 435 feet high at its northern end; its northern and western sides are cliffy and fringed with rocks, the cliffs on the northern side being white. On the southern side is a fine sandy bay used by small craft, but it is exposed to southerly winds and a heavy swell rolls in. A stream runs into the sea from copious springs on its eastern side.

The population is about 400, principally seafaring men.

Paxo Island, ancient Paxi (lat. $39^{\circ} 12' N.$, long. $20^{\circ} 11' E.$), the smallest of the Ionian Islands, is nearly $5\frac{1}{2}$ miles in length northwest and southeast, not quite 2 miles in width, and its greatest height is 809 feet; its shores are generally bold, particularly the western side, which rises in steep white cliffs. In general, the island is flat and covered with one dense olive plantation. The principal town, Gayo, once a small fishing village, is of some extent, the houses are well built, and a wharf is erected along its sea face. There are several villages prettily situated amidst the thick olive groves, having an air of comfort not met with in the other islands. The island exports oil, firewood, and flat stones, and its population may be about 5,000.

Port Laka, at the northern extremity of the island, is an indentation about 600 yards deep and 200 yards wide at the entrance, with from 2 to 3 fathoms water within, having a few houses at its head where boats resort during the summer months; but being open to northeasterly winds, coasting vessels seldom anchor here.

Northwestward of the northern point of Paxo is Marmori Reef, where there are two or three rocks above water, one 25 feet high; a shallow rocky patch extends about 300 yards beyond them.

Telegraph cable.—The cable connecting Corfu with Paxo is landed near Laka Point.

On the eastern coast of Paxo, nearly midway between Ports Laka and Gayo and $1\frac{1}{2}$ miles northwestward of Madonna Lighthouse, are some rocks above water but close inshore.

Paxos Reef lies southeast of Port Laka outside the above-mentioned rocks, about 670 yards from the shore, with Madonna Islet Lighthouse bearing 145° distant 1.8 miles.

Port Gayo (lat. $39^\circ 12' N.$, long. $20^\circ 13' E.$), is an indentation in the eastern coast of Paxo sheltered by two islets. On Citadel Islet, the larger of the two, is a fort; and on Madonna, the smaller and northeastern islet, is a lighthouse; the islets are connected with the shore and with each other by shoal water, which also borders the northeastern side of Madonna where the Zuane, a large rock, is above water.

Between the islets and the shore of Paxo is this well-sheltered creek, with a depth of from 4 to 10 fathoms; but, being narrow, the small vessels using it have to haul close inshore and moor head and stern. The deep water is on the northern side of Citadel Islet, the passage to the southward between Citadel Islet and the town becoming very narrow and carrying only about 1 fathom water.

The town of Gayo is erected in a semicircle southwestward of Citadel Islet in the bend of the creek; it contains about 2,000 inhabitants, who have to depend almost entirely on rain for their water supply. Small quantities of provisions may be obtained.

Light—Madonna Islet.—The lighthouse on Madonna Islet is a square tower 26 feet high, from which, at an elevation of 85 feet above the sea, a fixed light, white and green sectors, is exhibited. The white light is visible 12 miles, green light 7 miles. (See Light List.)

Anti Paxos (lat. $39^\circ 09' N.$, long. $20^\circ 15' E.$), is 2 miles in length, a mile in breadth, and generally level, but rises at its northern end to a height of 353 feet. It extends in the same direction as Paxo, from which it is separated by a deep passage, about 1 mile wide, in which there are strong current eddies; the coast is bordered by a narrow bank with a few rocks, but is free from danger with the exception of a 2-fathom patch near its northern extremity. The Plakka group, consisting of several small islets or rocks, lies off its southeastern end,

terminating in a reef extending little more than 200 yards from the outer islets; at its edge the water suddenly deepens.

On the eastern side of the island is a small bay near the only village, where the fishing boats are secured. The chief occupation of the few inhabitants is the cultivation of patches of land, which produces excellent fruit but no oil.

Light.—On Novara Point, the southeastern extremity of Anti Paxos, from a square masonry tower with dwelling attached, 39 feet in height, and at an elevation of 136 feet above the sea, an occulting light showing red and white sectors is exhibited. The white light is visible 17 miles, red light at 12 miles.

Madonna Shoal.—This dangerous rocky shoal is about 1,200 yards in extent, east and west, by 800 yards north and south, its outer edges having upon it from 3 to 5 fathoms water; thence it suddenly deepens; the shallowest part, which at times uncovers, lies $84^{\circ} 2\frac{1}{2}$ miles from Madonna Lighthouse. At 1,100 yards south-eastward of the shallowest spot is a patch with 7 and 8 fathoms.

About $\frac{1}{2}$ mile clear of these shoals in all directions there is a depth of from 40 to 55 fathoms, and the channel on either side is clear and deep. Sailing vessels should avoid their vicinity on account of the current.

Clearing marks.—Mount Mavronoros just open westward of Sivota Island, bearing about 154° , leads westward of the shoal. Rodovari Point, the northwestern extremity of Anti Paxos, in line with or only just open of Kalkonisi Islet at the southeastern extremity of Paxo, also leads westward. Mount Mavronoros, bearing 349° and well open eastward of the western peak of Sivota Island, leads eastward of the shoal.

Madonna Shoal is covered by the red sector of Novara Point Light and by the green sector of Madonna Island Light. Either white light in sight clears the shoal.

Directions—North Channel.—To a steamer the approach to the anchorage at Corfu presents no difficulties, as there is water sufficient for all classes of vessels either by the north or south channels.

Sailing vessels approaching from the northwestward or from the Adriatic with northerly or westerly winds, should make for Fano Island and leave both it and Merlera on the starboard hand. Arriving from the westward with a commanding breeze, a vessel may pass southward of Fano and Merlera, giving the former a fair berth, but passing nearer to it than to Samothraki. From 1 mile southward of Merlera a 95° course for 12 miles leads about 1 mile northward of St. Katerina Point, the northern extremity of Corfu and entrance point to the North Channel.

On entering the North Channel, steer for Tignoso Lighthouse and pass about 300 or 400 yards westward of it; then bring it to

bear 340° and steer 160° until the hill, 396 feet high (on which are, or were, the ruins of an old mill), southwestward of San Stefano Point bears 281° , when the vessel will be southward of the Serpa Rocks and may steer as convenient for Corfu Road.

A vessel passing eastward of Tignoso Lighthouse should keep the southern end of Merlera Island open of Cape St. Katerina until within a long $\frac{1}{2}$ mile of the Albanian Coast; then steer to the southward midway between that coast and the Barchetta Rock, which is not larger than and not unlike a small boat bottom up, taking care not to bring Tignoso Lighthouse more northerly than 340° until the hill, 396 feet high (old mill), bears 281° , then proceed as before.

With variable or contrary winds, it is advisable to keep the mainland aboard until southward of Serpa Rocks.

At night, a vessel should steer for Tignoso Light, passing 300 or 400 yards westward of it, then bring it to bear 340° and keep it so until about $1\frac{1}{2}$ miles southward of Tignoso Light and assured of being southward of the Serpa Rocks, when the light on the citadel of Corfu will bear 193° . From thence the vessel should be guided to Corfu Road by the Citadel Light.

In taking the passage between Tignoso and the mainland, give the light a berth of nearly 1 mile; and when at this distance eastward of it, with Corfu Citadel Light bearing 193° , steer this course which leads nearly midway between the Barchetta Rock and the mainland. When Tignoso Light bears 280° , the vessel is southward of Barchetta Rock, but the same course for Corfu Citadel Light should still be continued, taking care not to bring Tignoso Light northward of 340° until $1\frac{1}{2}$ miles southward of it, and give the coast of the mainland a prudent berth.

In working to the southward through the North Channel, keep the mainland or Albanian shore aboard as it is bold and clear of danger, and stand only halfway toward the western shore until southward of Serpa Rock.

South Channel.—The distance between Cape Bianco and the northern end of Paxo is 7 miles, but the passage is contracted to about $5\frac{1}{2}$ miles by the Bianco Shoal. Approaching from the westward, keep in mid-channel, giving Cape Bianco a berth of at least 3 miles, and in rounding it at this distance the vessel's position should be checked by bearings. Paxo Lighthouse, bearing 202° , or Sivota Island Peak 22° , leads southeastward of Bianco Shoal.

The coast of the mainland as far northward as Prasudi Island is clear and bold. Lefkimo Point should have a berth of about a mile; and when northward of Prasudi Island the white houses of the village of Mourzo should be kept open of that islet to avoid the Bac-

chante Flats, which are steep-to. When Corfu Citadel Light is seen, alter course as convenient.

In coming from the southeastward between Paxo and the mainland the passage on either side of Madonna Shoal may be taken. Preference should be given to the passage eastward of the shoal, and in a sailing vessel the mainland should be kept aboard, particularly toward sunset, as at night the wind is almost certain to be off the land. The current also sets to the northward along this coast.

At night.—Coming from the northwestward or westward, Paxo Light should be kept eastward of 129° until Sivota Light is in sight, when the two will enable the mariner to fix his position accurately. Paxo may be rounded at the distance of 2 to 3 miles, and when Sivota Light bears 16° or northward of that bearing it may be steered for, passing eastward of Bianco Shoal. When about 2 miles from Sivota, steer to pass it from a mile to 2 miles distant; thence shape a course for Corfu Road, being guided by Sivota Light and by the Lights of Lefkimo Point and Corfu Citadel as they are seen.

From the southeastward it is advisable, especially in a vessel under sail, to pass eastward of Madonna Shoal, keeping in mid-channel or well over on the Albanian Coast, which is clear and bold. In proceeding to the northward, when near Bianco Shoal, do not bring Madonna Light eastward of 179° and steer toward Sivota Island Light and through the Corfu Channel as before directed.

If proceeding westward of the Madonna Shoal, keep Madonna Island white light in sight until having passed through the red sector of Novara Point Light, that light bearing eastward of 167° shows white; thence, keep it showing white until the red sector of Madonna Light is passed; thence for Sivota Light bearing northward of 116° , passing it and proceeding toward Corfu Road as before directed.

Winds.—Southeasterly and southwesterly winds, accompanied by cloudy weather and heavy rains, are prevalent in the Corfu Channel during the winter. Northerly and northwesterly winds sometimes blow with violence but do not last long. In the summer season, the breezes are generally light.

Currents.—The currents are fairly strong in the narrows between Cape Scala and Port San Stefano; their general direction is northerly, but there is ordinarily a surface current depending on the force and direction of the wind; in strong winds, it attains a rate of between $1\frac{1}{2}$ and 2 miles an hour.

CHAPTER XII.

GULF OF ARTA AND COAST OF GREECE—SANTA MAURA, CEPHALONIA, ITHICA, AND ADJACENT ISLANDS.

Gulf of Arta—General remarks.—This gulf, ancient Ambra-kikos, has its entrance at latitude $38^{\circ} 56' N.$, longitude $20^{\circ} 46' E.$, and is $18\frac{1}{2}$ miles in length from Prevesa to the shore of Makrinoro Ridge on the east, where its extreme breadth is about 10 miles, but the coast line is so irregular and indented with bays with long projecting points, that in places the dangers off the latter, on opposite sides of the gulf, are little more than 2 miles apart. There are a few islets in the gulf, some of which are covered with shrubs and verdure; the chief group is off Pothani Point between Salagora Road and the islets extending from Palmatero Point near the entrance to the Arta River.

The natural scenery of this gulf is beautiful and picturesque and the numerous Greek and Roman ruins on its margin must always afford peculiar interest to those who have the good fortune to visit them. About 3 miles northward of Prevesa is the site of Nicopolis, the city founded by the Emperor Augustus to celebrate his victory at Actium over the combined forces of Mark Antony and Cleopatra; the ruins of this city lie scattered over a large space of ground. At the foot of a range of hills on the north, just on the slope, is a large amphitheater with its front facing south, the most conspicuous of all the ruins now to be seen.

Throughout the shores of the gulf, the hills are mostly composed of rugged blocks of primitive limestone, in the crevices of which grow the wild myrtle, ferns, prickly shrubs, and several bulbous roots; also a little scarlet blossom from which the Turks and Greeks manufacture the beautiful scarlet dye used for their caps and dresses, as well as a yellow flower from which a corresponding dye is produced.

Prevesa.—This town stands on the northern side just within the entrance of the Gulf of Arta, close to the shore and facing eastward, with a fine plain extending westward and northward of it, studded with houses and interspersed with olive trees; ague is very prevalent at certain seasons. The streets are narrow, uneven, and often unpaved, and the houses are chiefly constructed of wood or built

in Turkish style of the adjoining ruins of Nicopolis. It was formerly one of the possessions of Venice, was subsequently occupied by the French, and was captured from them and almost destroyed by the Turks in 1798.

The population is approximately 7,000.

It is surrounded on the land side by a dry moat or ditch, the walls in many places being almost in ruins. Fort Nuovo, within the walls on the north, contains the principal mosque, residences of the chief authorities, etc. It defends the northern side of the harbor and the channel leading up the gulf. Fort San Giorgio, at the south-western angle of the town, guards the entrance and anchorage of the port. Fort Pantakratora, which entirely covers the approach to the entrance of the gulf and is surrounded by a wet ditch, is much dilapidated and its interior in ruins.

Communication.—Prevesa communicates by telegraph with Arta and Janina and with the general European system. In consequence of the entrance of the gulf having only about 12 feet water, small vessels only can enter.

Trade.—The exports consist principally of olive oil, wool, butter, cheese, and valonia; the imports are cotton and woolen goods, colonials, petroleum, and wine.

The coasting trade is almost entirely carried on by Turkish or Greek boats.

The Port is bounded on the west by the walls of the town, and on the east by the low sandy promontory on the opposite shore, terminating northward in Akri Point, on which are the ruins of a tower. It is nearly 1,400 yards in extent north and south and about 800 yards east and west, with a depth of 7 to 10 fathoms. A fair berth for anchoring is with Akri Tower east by north and the southeastern bastion of Prevesa about south-southwest in about 8 fathoms, mud.

From a little southward of Fort Nuovo a long, shallow flat covered with from 3 to 6 feet water extends halfway across to Akri Point and borders the shore to the northward, but this is just northward of the parallel of Akri Point and beyond the anchorage.

Prevesa Strait, the entrance to the Gulf of Arta, is easily distinguished from seaward by the white forts of Pantakratora and Punta on either side. An extensive flat extends across the entrance from Fort Pantakratora in an outward irregular curve southward to Skilee Point, $1\frac{1}{2}$ miles distant on the other side.

The bar consists of an accumulation of seaweed, coarse sand, and gravel, apparently formed from deposits from the ebb of the gulf and banked up by the flood and resistance from the sea. It is covered with small knolls of a darker shade than the bottom between them, and, being a little shallower, these are always perceptible unless it blows hard enough to ruffle the water.

Buoys.—No leading marks can be given for crossing the bar, but two buoys are supposed to mark the channel. As the bar alters in position and depth and the passage across it is intricate a local pilot should always be employed.

Anchorage.—Vessels generally anchor outside to wait for a pilot, in a depth of 8 or 9 fathoms, with Mytika Bluff bearing 345° and Fort Punta 75° , distant 2 miles; the bottom is foul. A large vessel should anchor farther out in about 11 fathoms, mud, with Mytika Bluff 348° .

Current.—A current is frequently found setting over the bar at a velocity of $2\frac{1}{2}$ knots an hour, changing every six hours, but with strong westerly or easterly winds, its strength and direction are irregular. The rise and fall of tide may be about 1 foot.

Port Vathi.—The mouth of this inlet is $\frac{1}{2}$ mile northward of Prevesa and it extends more than $\frac{1}{2}$ mile in the same direction, carrying depths of from 8 to 3 fathoms until within 200 yards of its head, when it becomes shoal. A short distance up the inlet on the east is a fine spring of clear water, near some ancient Roman ruins.

Prevesa Gulf, north shore.—From the entrance of Port Vathi the north shore of Prevesa Gulf eastward for 2 miles is a sand and shingle beach in front of a low, natural bank, and at the foot of some well cultivated sloping hills. Along this shore there is plenty of fresh water obtained from wells not far from the beach, and of such good quality that it is sent for from Prevesa. This beach is a common resort for fishermen, who draw their nets on it.

Beyond the sand and shingle beach is a small bay, where, at a few paces in the rear of the beach, is a lagoon abounding in mullet and cockles, and about $\frac{1}{4}$ mile up the valley is a farm pleasantly situated and surrounded by hills, from which several streams flow and unite at this spot, where they form a small rivulet and run into the lagoon.

Cape Skara, the southeastern extremity of the small bay just mentioned and the southern termination of a peninsula projecting south-eastward $3\frac{1}{4}$ miles, is 485 feet high, with a tower on it, and is steep-to. The peninsula presents a front nearly 1 mile wide and having three distinct points, of which Cape Skara is the southern, Cape Skaphio the eastern, and Myrtavi Point the northern.

Prevesa Gulf—Southern shore—Akri Bank.—The low shore of Akri Point is bordered on either side by a shallow bank, which, on the eastern side, extends in that direction about 1 mile, and was reported to be extending in 1907; vessels bound up or down the gulf should be careful in rounding it. No marks can be given, but in steering northeastward from the anchorage at Prevesa, by keeping about 300 yards from the point a vessel will be nearly in mid-channel between Akri and Fort Nuovo Shoals. When the minaret in Fort

Nuovo bears 266°, keep it on this bearing and it will clear both the Akri Bank and the tail of the shoal extending from the northern shore.

The shore from Akri Point for about 3 miles southeastward is low and sandy and is the western shore of the Preveša Gulf; farther on it begins to assume a hilly aspect and inclines more eastward until it reaches two or three small bays. The edge of Akri Bank, which is 1 mile eastward of Akri Tower, gradually inclines toward the shore of the gulf until it terminates near the westernmost of these little bays; the bank should not be approached into less than 8 fathoms water, as it is steep-to.

At the termination of the sand the coast turns northward nearly at a right angle and is a bold, precipitous tongue of land terminating in Cape Panaghia, and forming the eastern side of Preveša Gulf.

Gulf of Arta—Guidronisi and Kephalo Islets.—The large basin of the Gulf of Arta opens between the two bluff headlands of capes Skara and Panaghia, both of which are steep-to. The small rocky islet of Guidronisi lies about 1 mile northeastward of Cape Skara, and 700 yards from the shore abreast Cape Skaphio; it has some rocks on its northern side but deep water around it.

The islet of Kephalo is about 1 mile northeastward of Cape Panaghia; a shoal extends from the cape more than halfway across to the islet, leaving between them a narrow space with a depth of 17 fathoms. Kephalo is surrounded by a rocky shoal about 100 yards wide, but it extends farther at the northwestern end, where there is a rock at its edge above water.

Vonitza Bay, between capes Panaghia and Gheladha, is 2 miles wide and falls back southward about the same distance to the town of Vonitza at its head. It presents a grand and interesting view of the extensive valley stretching away southward, bounded on either side by steep wooded mountains and watered by several streams from their sides. Those which flow through the valley are shaded by the huge branches and foliage of plane trees, which are about the size and have the appearance of our largest oaks.

Fortress Vonitza is Venetian and stands on a steep hill on the southwestern margin of the bay overlooking the town on the east, fronting the bay northeastward, and on all sides commanding every approach. On the western side of the fortress an extensive lagoon washes the foot of the hill on which it stands.

There is anchorage about $\frac{1}{2}$ mile northward of the town in a depth of 7 or 8 fathoms, or at any convenient distance. Vonitza contains about 3,500 inhabitants.

Water.—A stream of excellent water runs through the town, and a branch runs into the sea between the town and the little village of Bughat, just to the eastward; this is a good place for boats to water.

In the fortress are one or two excellent springs of water, which is remarkable, it being on a high, rocky hill.

Cape Gheladha.—A short distance eastward of Vonitza there is an islet close to the shore; thence the sandy beach from the town continues $\frac{1}{4}$ mile farther, when it turns abruptly northward and terminates at Cape Gheladha, the low eastern point of the bay. The coast here is steep, with several small inlets where boats can beach, deep water all along, and is backed by hills declining from Mount Amydros.

Mount Amydros (lat. $38^{\circ} 55' N.$, long. $20^{\circ} 56' E.$), about 2 miles eastward of Vonitza, is 1,483 feet high and is the northern height of the range of mountains bounding the eastern side of the Vonitza Plain. The view from its summit is very extensive, commanding the gulf beneath with the circling eddies caused by the streams of the Arta and Luro, as well as some of the Ionian Islands and the mountains of Suli, Pindus, and Ceta, their tops capped with snow and generally above the clouds.

Coast.—From Cape Gheladha to Volimi Point, about 3 miles eastward, the coast is bold but skirted close inshore by sunken rocks; at first the shore is steep, abrupt, and woody, but it declines toward Volimi Point. The soil in several places is thickly covered with dwarf oak and brushwood, but some parts westward of Volimi and near the shore are low and swampy; off these places the water shallows, but deepens again as Volimi Point is approached.

Ruga Bay.—Following the low sandy point of Volimi, is Ruga Bay, terminating eastward in Kaliki Point, which is low and sandy like Cape Gheladha. Ruga Bay, 2 miles wide at the entrance and receding about $1\frac{1}{4}$ miles, has a depth of 5 to 8 fathoms. On the southern shore, a little removed from the beach, are some extensive ruins on the northern border of a large lake washing their walls. A little farther eastward are some ruins of Roman origin. Near the Roman ruins there is a fine spring of fresh water.

The land bordering the lake inland is hilly and thickly wooded with stunted oak, of which the bark and acorns, called valonia, are articles of commerce used for tanning. In the interior there are forests of large timber. The Lake of Ruga abounds in fish and is the resort of the pelican and other aquatic birds.

Balim Bay.—Kaliki Point is the eastern extremity of Ruga Bay, and, notwithstanding it is low and sandy, has a depth of 20 fathoms close to it. From thence the shore trends southward for about $1\frac{1}{4}$ miles to Balim Bay. The depth of water along this shore, from 20 fathoms near Kaliki Point, shoals suddenly at the same distance offshore to $4\frac{1}{2}$ fathoms, but there are no hidden dangers. In about the center of Balim Bay there is good anchorage in 5 fathoms, mud.

The country southward and southwestward of the bay is low and swampy for a considerable distance; beyond this it rises in steep, rugged hills and mountains with deep rents and chasms between them.

Lutraki Bay is the southeastern part of the bay of which Balim Bay is the southwestern shore just mentioned leading to Balim Bay. It has a snug little basin or cul de sac, like a wet dock, about 1 mile in circumference, which does not show itself until in the narrow channel leading into it. The eastern and western sides are bounded by steep hills, the interior shore being a shingle beach, and along the western side is a road leading to Missolonghi.

The shore northward of Lutraki Bay gradually declines in height toward Makriamiti Point, with a few sandy creeks where boats can beach. It is steep and cliffy, skirted close to by sunken rocks, and can be approached to a prudent distance. The country in the vicinity of Makriamiti Point has a rocky sterile appearance, but is covered with stunted shrubs with a few olive trees here and there.

Kervasara Bay is in the southeastern corner of the Gulf of Arta; its entrance between Makriamiti Point and the foot of Mavro Vuni, or Black Hill, northeastward of it, is about 2 miles wide. It runs in southeastward nearly 4 miles, the coast being bold with deep water throughout, except a 2-fathom shoal about 150 yards from the shore, at its head, and about 700 yards eastward of the village of Kervasara. This shoal is said to be the head of an occasionally active submarine volcano. Capt. A. Miaulis, of the Greek Royal Navy, reported in 1875 that two eruptions were known to have taken place, one in November, 1847, the other in February, 1865. Fish were then destroyed in great numbers and the sea covered with sulphur, which floated as far as Prevesa.

At the head of Kervasara Bay, near the village and at the beginning of a deep glen, are the ruins of the ancient city of Limnoea, part of whose walls at the base of the hill are washed by the sea. The ruins consist mainly of two walls of solid rough marble blocks ascending the hill from the beach at an angle of about 30 degrees, and for a considerable way up the hill the walls are perfect. The principal part of the ruins surround the summit of the hill in a circular form with numerous square projecting towers united with each other by the walls. The whole about 2 miles in circumference.

The road from Albania to Missolonghi winds through the glen, a formidable pass, very narrow, and commanded by craggy fastnesses. Southward of Limnoea is Lake Ambrakia, between two chains of mountains, the road dividing and passing on each side of it.

The neighborhood of Kervasara is reported to be the most healthy in the gulf, as it is not subject to the malaria so prevalent everywhere else.

Light.—At Phano Point, on the western side of Kervasara Bay, a fixed red light, elevated 45 feet above the sea, is exhibited from an iron post and is visible 5 miles.

East coast.—Following the eastern shore of Kervasara Bay, at $2\frac{1}{2}$ miles from its head, is the entrance to Armyro Bay, a shallow salt-water lagoon 1 mile in extent east and west, with its narrow mouth open to the southward. From thence the shore for 3 miles northward, passing the hamlets of Vlika and Arapi, southward and northward of the base of Mavro Vuni, is shoal for nearly $\frac{1}{2}$ mile off. The country in the rear is low and swampy, the Kataphorno Lake lying just eastward of Arapi.

Along the base of the Makrinoro Ridge the coast is bold and in most places inaccessible except at the foot of the deep ravines between the hills, where a small sandy cove may permit a boat to beach; but these ravines, as also the hills, are so overgrown with thick tangled underwood as to render a passage through them impracticable. At the northern end of the Makrinoro Ridge and in the northeastern corner of the gulf are the Cyclopean ruins of Paleo Pyrgo. The road leading from western Greece to lower Albania runs along the upper part of these acclivities.

North coast.—The northern coast of the Gulf of Arta is one unvaried, but irregular, continuation of swamps, marsh, and lagoons, in many places separated only from the water of the gulf by a narrow strip of sand and mud, which in winter is overflowed and gives the appearance of a much more extensive area to the gulf than it has in reality, as these lagoons and swamps run a considerable distance toward the higher land. To these swamps and undrained lands may be attributed the baneful malaria which renders this country so unhealthy in summer, and especially in the months of August and September.

Large snakes and reptiles, some of which are venomous, dwell in the rushes of these marshes; and swarms of mosquitoes are troublesome, not only here but in every part of the Gulf of Arta.

The lagoons abound in fish and enormous prawns and are the resort of vast numbers of wild aquatic birds, amongst which are numerous flocks of pelicans.

The rivers Luro (ancient Charadrus) and Arta (ancient Aracthus) flow through the extensive plains and swamps lying between the gulf and the mountains from whence they take their rise.

The depths all along the northern shore are very irregular and the lead is the only guide when in its vicinity.

Arta River discharges itself into the gulf about $4\frac{1}{2}$ miles westward of Paleo Pyrgo at the northeastern corner, winding in serpentine reaches from the city of Arta to its mouth. It is navigable for boats for about 4 miles. The mouth of the river shifts; the old

mouth, $2\frac{1}{2}$ miles westward of the present one, is closed by sand and mud.

There are several villages on the banks of the river. Komano, about 3 miles up by the stream, is on the east bank. About 2 miles farther is Nekhori, on the west bank; and 3 miles beyond, on the same bank, is Kalaino. Around these villages are patches of land indifferently cultivated, although the soil beyond the swamps appears to form a rich alluvial bed highly capable of tillage.

The City of Arta, ceded to the Greeks in 1881 and now the capital of the Province of Athamania, is on the eastern bank of the river, about $7\frac{1}{2}$ miles in a direct line from its mouth, but double that distance following all its sinuosities. It occupies a part of the site of ancient Ambracia, the remains of which in places are included among the modern Turkish and Greek buildings, more especially in the fort. The regular, oblong, square stones of immense size, minutely fitting together like brickwork, without cement, and said to be the architecture of the Hellenians, composes the substructure of the citadel on which the Venetians raised a fortification, the Turks adding a little of their style of building in the interior of the fort. One of the stones in the eastern wall of the citadel is 15 feet long and 5 feet broad, and most of the others are nearly the same size. The population of Arta is approximately 15,000.

Light.—On **Araklo Point**, $1\frac{1}{2}$ miles eastward of the entrance to Arta River, an occulting light with red sector elevated 36 feet above the sea, is exhibited from a cylindrical masonry tower, with dwelling. (See Light List.)

Korako Islets.—Of the small islets in the gulf, this, the chief group, is between the mouth of the Arta and Mount Salagora; they extend about $1\frac{1}{2}$ miles southward from Pothani Point and appear to have been at one time connected with it as they consist wholly of soil. Vuvalos is the largest and southernmost of these islets. Between them and the present mouth of the Arta, the long broken point of Palmatero projects southward with shallow water round it. The low point about $1\frac{1}{2}$ miles eastward of Palmatero Point is said to be growing out in a southeasterly direction. Vessels in this vicinity should be guided by the lead.

Salagora Road.—This anchorage is $2\frac{1}{2}$ miles northwestward of the Korako Islets and has a depth of $3\frac{1}{2}$ to 4 fathoms about $\frac{1}{4}$ mile from the shore abreast of Mount Salagora, the only land of any height bordering the northern shore of the Gulf of Arta; at about 1 mile south of the mount there is a small 3-fathom patch at the edge of the 5-fathom curve. Eastward of Mount Salagora is Lake Logaru, and westward of it Lake Zukalia, both separated from the waters of the gulf by only a narrow, sandy beach.

Luro River is a rapid stream finding its way into the gulf through a swamp westward of Lake Zukalia. About 7 miles from its mouth, where there is a ferry, the river is rapid and 100 yards wide.

Nicopolis Bay.—A little southward of the mouth of the Luro, a ridge from the hills northward of Nicopolis reaches the sea with grassy cliffs and beach at their foot; then follows a long, narrow spit projecting southward and nearly closing in Mazoma Lagoon, leaving only a small opening. The ruins of Nicopolis are seen across the lagoon. From thence a precipitous and bold shore trends southeastward about 4 miles to Myrtavi Point, north side of inner entrance to Prevesa Gulf.

Coast—Port San Nikolo.—Between Skilee Point at the entrance to Prevesa Strait and Cape Yero-Tripa in Santa Maura Island, $5\frac{1}{2}$ miles distant, the coast forms the deep indentation, Demata Bay, in the eastern part of which is Port San Nikolo and in its southern part the roadstead of Santa Maura. From Prevesa Strait, the low flat land continues southward bordered by rocks and shallow water extending some distance off, the 5-fathom curve being in places 1 mile from the shore. At 2 miles southward of Skilee Point, the low land becomes marshy and recedes eastward, forming a large bight about 2 miles deep, choked with rocks and shallow water, but leaving in the interior the circular space named Port San Nikolo, $\frac{3}{4}$ mile in diameter, with $3\frac{1}{2}$ to 4 fathoms, mud bottom, and excellent holding ground, but available only for small coasting craft and fishing boats acquainted with the shallow passages through the reefs and shoals.

At the head of Port San Nikolo, between a sandy spit projecting southward from the low marshy land on the north and a bluff point 60 feet high on the south, is the entrance into Chelovero Harbor, a shallow area abounding in fish. The shore northward of Chelovero Harbor is sandy with off-lying rocks.

Plaka Spit.—The entrance to Port San Nikolo is protected on its southern side by Plaka Spit, a narrow ridge of conglomerate rock about 1 mile or more in length and a foot above water, which projects northward and near its termination trends eastward. From the shoulder of this spit a reef extends 800 yards in a northerly direction and terminates in a ridge of huge boulders which form the margin of the surf and breakers in strong northwesterly winds.

The conglomerate formation here mentioned is seen also at Cape Yero-Tripa, the north extremity of Santa Maura, from whence it skirts the coast eastward and northward to the Prevesa Strait; in places it is broken, forming numerous rocks and the small islets Doozinani, Achiloo, and Jefti, the two latter awash and on the northern side of entrance to the bight. This conglomerate rock is

useful in the construction of moles and works subject to the wash of the sea.

Doozinani Rock—Beacon.—Doozinani Rock (lat. $38^{\circ} 52' N.$, long. $20^{\circ} 46' E.$) has on its northern end a beacon, being the base-ment of a lighthouse that formerly existed to mark the southern side of the entrance to Port San Nikolo. This rock lies 1,200 yards northeastward from the Lazaretto on San Nikolo Islet, which latter is within the Plaka Spit. At 1,000 yards northward of Doozinani is Achiloo Rock (awash); between the two is the entrance to Port San Nikolo, with 2 to 3 fathoms water, but the channels over the bar within are tortous and shallow, not being more than from 6 to 8 feet deep.

Vessels working up to Santa Maura roadstead in the vicinity of these dangers should not stand into less than 8 fathoms water, and should keep Mount Lamiah well open southward of the houses of the Lazaretto on San Nikolo Islet. A bearing of the lighthouse on Santa Maura mole will also indicate a vessel's approach to these rocks.

The sea breeze forces a considerable quantity of water into the bight of San Nikolo which at sunset when the breeze dies away runs out with some strength.

Santa Maura—General remarks.—The island of Santa Maura, ancient Leucas, is rather less than 19 miles in length, and its extreme breadth 8 miles. A lofty limestone ridge stretches the whole length of the island with several spurs or ridges extending eastward; the highest and most southern elevation, Mount Stavrota, has a double top and, being 3,700 feet above the sea, is conspicuous from the northward and westward. During winter the highest mountains are generally capped with snow.

Vegetation generally is good, but is scanty near the summits of the heights. The island has several rich fertile plains, of which the largest extends westward and southward from Santa Maura or Amaxiki, the capital town, at the northeastern end of the island. The town is surrounded on three sides by an extensive shallow lagoon with large salterns in the neighborhood on its southeastern side. The island produces a large crop of olives; its principal productions are oil and wine, wheat and maize, and a quantity of salt. Traces of quicksilver have been found near Mount Stavrota.

The climate is good, except along the northeastern shore, where it is very unhealthy, intermittent fever prevailing during the summer months. Earthquakes are prevalent during the hot months, but are slight and scarcely perceptible.

The population of the island, amounting to about 29,500, is a hard-working, quiet, and hospitable race, husbandry being the chief occupation; a few are fishermen, and as a rule they are in favor of a

seafaring life. There are 15 churches in the town of Santa Maura, which has a population of 8,500.

Santa Maura Citadel, erected on the narrow strip of low ground which incloses the lagoon and once capable of offering considerable resistance, is now dismantled and useless. It covers a large space and shows evident signs of its numerous masters in its various materials and in its construction and outworks. Within it is a building formerly a Turkish mosque, which afterwards became a Christian church and then a Government storehouse.

Lights.—On the north battlement of the Citadel at Santa Maura stands a square tower, 24 feet high, from which, at an elevation of 57 feet above high water, is exhibited a light, visible 13 miles.

At the end of Santa Maura Mole, from an iron support, a green light is exhibited at an elevation of 25 feet above high water, visible 4 miles. See Light List.

Mole and roadstead.—About 100 yards westward of the citadel, a well-constructed mole projects about 400 yards northeastward, thence 100 yards eastward, covering a small area and giving shelter to small vessels from northwesterly winds; along the mole are bollards for making fast, and by dropping an anchor to the northeastward a vessel can haul in and secure to it. Small coasting craft haul into the canal under the citadel. On the western side of the citadel, between it and the mole, is a causeway leading to the town, distant about $\frac{3}{4}$ mile.

During fine weather in summer vessels find temporary anchorage in the open roadstead in a depth of about 8 fathoms 700 yards 331° from the Citadel Lighthouse. A large vessel should anchor farther out in 12 to 15 fathoms. This anchorage is open to northerly or northwesterly winds, which send in a heavy sea.

Winds.—Land and sea breezes are very regular in summer; the former blow from about 10 p. m. until 5 a. m.; the latter set in about 10 a. m. and cease about 7 p. m., with calms during the intervals. Frequent thunderstorms occur, especially about the equinoxes, when heavy squalls may be expected from the hills and mountains.

Telegraph cable.—The cable connecting Santa Maura with Corfu crosses the canal just southward of the lighthouse.

The harbor of Santa Maura is approached by the narrow channel between the mole and citadel, on the eastern side of which is a stone breakwater about 2 feet high; in the harbor there is a depth of 13 to 16 feet, and a jetty with crane and bollards and a depth of 11 to 13 feet alongside it. Vessels secure with their sterns to the wall.

Santa Maura Canal, between the island of Santa Maura and the mainland connects Santa Maura Roadstead with Port Drepano, and is navigable for vessels of 14 feet draft, the depth in the middle

of the canal being maintained by dredging to 15 feet. The channel is marked on each side by beacons, and is clearly defined by the color of the water, which is dark green in the deepest part and light yellow on the shallows. There is a floating bridge across the canal just southward of the citadel, which is hauled aside to allow passage of vessels.

Coast.—From the mole of Santa Maura to Cape Yero-Tripa or Windmill Point, $1\frac{1}{2}$ miles westward, the shore is a shingle beach which in most parts has become compact and solid rock. Cape Yero-Tripa is the northern extremity of Santa Maura Island, and the northeastern point of Flayva Bay; the point is foul to $\frac{1}{4}$ mile off and should have a wide berth. Extending along the beach of the bay for about 1 mile southward of Cape Yero-Tripa are several windmills.

Cape Zuana, 2 miles southwestward of Cape Yero-Tripa, and the southwestern point of Flayva Bay, is a bold clifty headland, and, except a few sunken rocks skirting the shore close in, is clear of danger. At about 3 miles southward of the cape is a bluff promontory forming the inlet of Santa Nikita, open to the northward, which in fine weather may be used by boats; thence the high coast continues southward, trending southward, 14 miles to Cape Dukato. At 2 miles southward of Sesola Islet, it becomes broken and assumes a whitish appearance, to which circumstances the southwestern promontory of Santa Maura owes its ancient name of Leukas.

The coast is skirted here and there by sunken rocks and also by some above water, at a distance of 200 yards. At 2 miles northward of Cape Dukato is a remarkable triangular white cliff, about 780 feet high, celebrated as the famous Sappho's leap.

Sesola Islet (lat. $38^{\circ} 41' N.$, long. $20^{\circ} 33' E.$), $9\frac{1}{2}$ miles from Cape Zuana and 1.3 miles from the coast, is triangular in form, 400 yards in extent, 114 feet high, and perpendicular on its southwestern and southeastern sides, where many huge rocky fragments show above water close-to. The islet slopes to the northward, where it is foul for about 200 yards, and is perforated at the southern end; in the channel between Sesola and the shore the depth is about 60 fathoms.

Cape Dukato (lat. $38^{\circ} 33' N.$, long. $20^{\circ} 33' E.$), the southwest extremity of Santa Maura, is bold and, with the exception presently described, steep-to; a little eastward of it is a small dark islet or rock. The current near the cape is often very perceptible.

Shoal.—At 250 yards 163° from Cape Dukato is a shoal 300 yards in diameter, consisting of rocky pinnacles having a least known depth of 5 fathoms, with 30 fathoms around it.

Cape Dukato Light.—From a square lighthouse 44 feet in height, with keeper's dwelling near it, situated 382 yards northeastward of Cape Dukato, is exhibited, at an elevation of 229 feet above the sea, a fixed and flashing light. See Light List.

Vasilico Bay.—The promontory terminating in Cape Dukato forms the western side of Vasilico Bay and is all along bold and steep-to. The bay recedes about 4 miles and affords excellent shelter, the best anchorage being off the center of the sandy beach at its head, in a depth of 12 to 15 fathoms, sand; closer in the water suddenly shoals from 7 to 2 fathoms. A good berth may also be found about $\frac{1}{2}$ mile westward of the little mole on the eastern side of the bay, in 10 fathoms, mud. The mole affords shelter to country boats during southerly winds. The bay terminates on the east in Lipso Point, nearly 5 miles east of Cape Dukato.

Basiliki (Vasilico) Light.—A fixed red light, visible from a distance of 2 miles, is shown from a stone column on Vasilico Mole-head, at the northeastern shore of the bay. Its exhibition is not, however, to be relied on.

The **Telegraph cable** connecting Santa Maura and Ithaca leaves the shore near the mole and is landed in Aphales Bay, in Ithaca.

Coast.—From Lipso Point to the southeastern extremity of Mount Porro the coast is irregular, high, and bold, and within this space are included the three bays of Aphteli, Sivota, and Ruda.

Sivota has good shelter for coasting vessels at its head; in the other two, and in the entrance of Sivota Bay, the water is too deep for anchoring. Mount Porro, 1,670 feet above the sea, which rises on the eastern side over the head of Ruda Bay, is $1\frac{1}{2}$ miles from its southern termination. The high and bold coast of Santa Maura now turns northward, the narrow, deep channel of Meganisi separating it from the island of that name.

Arkudi Island is separated from Lipso Point by a channel $2\frac{1}{2}$ miles wide, and from Marmaka Point, at the northern end of Ithaca, by a passage 3 miles wide. Arkudi is nearly 2 miles in length north and south, 1 mile in width, and 441 feet high on its western side, the eastern part being flat. Its shores are rocky and steep-to, but a sunken rock is charted about 400 yards off its southeastern point.

Meganisi Island is very irregular in form, the main portion extending $3\frac{3}{4}$ miles east and west and about $1\frac{1}{2}$ miles in breadth; but at the southwestern end of this part a long, narrow strip of land projecting nearly 4 miles southeastward terminates in Cape Kephali (lat. $38^{\circ} 35' N.$, long. $20^{\circ} 50' E.$), and forms with the main portion of the island a deep bight with its extreme points to the eastward; the shores of this bight are everywhere bold and the water deep. The island is hilly and the valleys cultivated; the hills range from 200 feet in height at its northeastern part to 874 feet high at the southwestern part.

On the northern and northeastern sides of the island are several deep inlets, with accommodation for coasting vessels. The two chief anchorages are ports Spiglia and Vathy, with the villages of Sparto-

kori and Vathy at their heads; another village is on the southeastern side of the island.

Two small islets or rocks, from 20 to 24 feet high, lie off the point which divides Abelike Bay from Port Atheni, on the northeastern side of the island, and are connected with it by reefs; a sunken rock also lies close to the shore of Elia Point southeastward of the former; the coast elsewhere has no outlying danger.

Elia Point Light (lat. $38^{\circ} 40' N.$, long. $20^{\circ} 49' E.$), fixed red, 46 feet above high water and visible 5 miles, is on Elia Point, the eastern point of the entrance to Port Atheni.

Kithro Island, just westward of Cape Kephali, is 1 mile in length and its height 300 feet; its coast is irregular, steep, and surrounded by a bank, which extends $\frac{1}{2}$ mile offshore round its western point, where there is a depth of from 5 to 17 fathoms. A small quantity of corn is grown on the island. Between it and the southwestern side of Cape Kephali is a channel only 300 yards wide but with 30 to 50 fathoms in the fairway.

Petallis Islet, $\frac{1}{2}$ mile northwestward of Kithro Island, is a barren rock 8 feet above water and about 200 yards in diameter; it is surrounded by a rocky bank with from 7 to 20 fathoms on it, outside of which the water is deep.

Meganisi Channel has its southern entrance between the island of this name and Santa Maura, a width of about $\frac{1}{2}$ mile with from 25 to 50 fathoms water. Northward of the northwestern end of Meganisi the channel is divided by Skropio Island, one part following its original direction northward between that island and Santa Maura; the other passing out eastward between Skropio and Meganisi.

The clifly coast of Meganisi, in the southern and narrowest part of the channel, is followed by a low shore bordered by a bank, on the southern part of which, nearly 200 yards from the shore, there is but $2\frac{1}{2}$ fathoms water. On this bank, $\frac{1}{2}$ mile farther northward, is Tiglia Islet, 130 feet high, with its northern part only about 200 yards from Meganisi Island; its southern point is foul for 200 yards offshore and the shallow water continues along its eastern side.

There is anchorage for small vessels between Tiglia Islet and Meganisi in 10 to 12 fathoms, sandy bottom. The channel through to the northward carries 19 fathoms past the foot of One Tree Hill, 521 feet high, at the northwestern end of Meganisi. The shore of Santa Maura is high, bold, and clear of danger.

Skropio Island is about 2 miles in circumference, hilly, and 186 feet high; its shores are irregular and shallow water surrounds the northwestern point. The little islet of Sokava, on the western side of Skropio, with rocks extending northward and southward of it, rises from the bank which surrounds Skropio except round its

eastern end. Between the islet and the coast of Santa Maura, the channel, a continuation of the Meganisi Channel, is nearly $\frac{1}{2}$ mile wide and has a depth of 35 to 40 fathoms.

On the northern side of Skropio, about 200 yards from its north-western extremity and in front of a bay, is the smaller island of Skropidi, with 10 fathoms water in the channel between them.

Hieromiti Shoals are three rocky patches in the eastern entrance to the Meganisi Channel nearly midway between Skropio Island and the entrance to Porth Vathy in Meganisi Island; the two patches nearest to Skropio have only 3 feet water over them, are about 200 yards apart, and each distant about $\frac{1}{2}$ mile from Kastri Point of that island, bearing from it, respectively, 99° and 111° ; the third patch, with 2 fathoms water, is 667 yards from the other two, nearer Port Vathy, being 1,200 yards from its northeastern point of entrance and bearing 288° from Marcia Point, Meganisi. These dangers are steep-to.

One Tree Hill, a peak at the northwestern end of Meganisi, bearing 227° and in line with the southern shoulder or fall of Mount Porro, leads southeastward of Hieromiti Shoals.

Sparti Island, northward of Skropio and $\frac{1}{2}$ mile from the shore of Santa Maura, is $\frac{3}{4}$ mile in length, about 180 feet high, bold, and steep-to on its southeastern side; but a bank extends $\frac{1}{4}$ mile westward from its southwestern part, on which is a rocky 7-foot patch with deep water close to it.

Between the southwestern end of Sparti and the entrance to Port Vliko is the little round island of Moodra, about 400 yards in diameter and 145 feet high. The passage into Port Vliko is on either side of this latter island.

The rock or islet of Socava, 60 feet high, is 700 yards northward of Moodra and nearly 300 yards from the shore of Santa Maura; the passage between this islet and the $1\frac{1}{2}$ -fathom patch off Sparti Island is 600 yards wide.

Port Vliko, on the Santa Maura shore abreast Skropio Island, is nearly oval in shape, being over 1 mile in length north and south and $\frac{1}{2}$ mile in breadth; it is bordered all round by a bank, which at its head, where the ground is marshy, extends off shallow for $\frac{1}{2}$ mile, but in the center of the port there is a depth of 4 fathoms, mud bottom. It is surrounded by high land, which, with the marshy ground and confined position, sheltered from all winds, causes fevers during the summer months. In the southwestern part are some houses—a customhouse and health office.

The entrance to the port is through a narrow channel carrying 4 fathoms water and about $\frac{3}{4}$ mile in length; in the port the depth is 4 fathoms, as above stated.

From Port Vliko northward the coast is bordered by a bank, which in places is shallow 300 yards off; and Mara Point with the coast beyond it is skirted by rocks.

Port Drepano is the bay included between the northeastern part of Santa Maura and the mainland; it is 3 miles deep, with an average breadth of $1\frac{1}{2}$ miles.

The anchorage at its head is in a depth of 7 to 12 fathoms, good holding ground, southwestward of the white fort of San Giorgios, which stands on a hill on the mainland and is 150 feet high. The small white rocky islet 16 feet high, named Observatory Islet, lies at the base of the hill, from which a sunken mole extends westward. On the opposite or Santa Maura side the remains of an ancient mole project eastward; at the extremity of each mole is a white stone pillar about 5 feet high marking the channel into the inner anchorage, which is used by small vessels loading with salt from the extensive salterns in the vicinity. The channel has from 4 to 3 fathoms water decreasing to 2 fathoms about 300 yards inside.

A good road leads to the town of Santa Maura where there is a telegraph station.

A steam vessel calls here from Patras weekly.

Observatory Islet Light, fixed green with red sector, 28 feet above high water and visible 5 miles, is exhibited from a masonry column on Observatory Islet. See Light List.

Kephali Point, the southeastern extremity of Port Drepano, is 35 feet high, bold, projecting, and skirted by rocks; the coast between it and the port is high and covered with brushwood. Kephali Point is the southwestern termination of Mount Saussi, which at $3\frac{1}{2}$ miles inland rises 1,650 feet above the sea. About $\frac{1}{2}$ mile eastward of the point is Vathi Vali Bay, open to southwesterly winds and about $\frac{1}{2}$ mile deep, shoaling from 16 fathoms water at the entrance to 3 fathoms at two-thirds of the distance in.

Light.—It is reported that a light is to be established on Kephali Point.

Miaulis Rock, about 200 yards in extent and steep-to, lies off the western point of entrance to Vathi Vali Bay, and its shoalest spot of $1\frac{1}{2}$ fathoms is 600 yards from the nearest shore, with Kephali Point bearing 317° , distant 1,000 yards. There are depths of from 16 to 23 fathoms between it and the shore. Observatory Islet Light is obscured over Miaulis Rock.

San Nikolo Islet.—At 1,200 yards eastward of Parathera Point, the eastern point of Vathi Vali Bay, is the islet of San Nikolo, about 400 yards in circumference and 67 feet high, with a chapel on it. The islet is surrounded by a bank which on its southwestern side extends 200 yards offshore, with 6 fathoms water.

Varcos Bay.—Northeastward of the islet is Varcos Bay, with cultivated land and a beach at its head, off which in the northeastern corner small vessels anchor in about 5 fathoms water, sheltered from southeasterly winds by Cape Varcos, the projecting eastern point.

Zaverda Bay.—Cape Varcos is the western extremity of Zaverda Bay. The distance from the cape to the coast on the opposite side of the bay abreast Mount Kandili is 4 miles, and from this line the bay recedes 3 miles. About $\frac{3}{4}$ mile northeastward of Cape Varcos, and near the shore, are the rocky Poghonias Islets. The shore at the head of the bay is an extensive beach, and the water shoals some distance off all round the bay, especially in the northwestern part. The cultivated valley or plain in its rear is the southern end of the plain extending northward nearly 8 miles to Vonitza, in the Gulf of Arta.

The village of Zaverda is near the shore on the eastern side at the head of the bay, and behind it, on an elevated plain, are several houses with gardens. The anchorage is off the beach northwestward of the village in a depth of 10 fathoms, mud. A steam vessel calls here weekly from Santa Maura and Patras.

Cape Kamilafka.—From the village of Zaverda the coast trends southward in nearly a straight line to Cape Kamilafka, a distance of 7 miles. The first part of the shore is bordered by a narrow bank, but when southward of Mount Kandili it is generally steep-to. The land rises in steep limestone ridges to Mount Kandili, which, at 1 $\frac{1}{2}$ miles inland, is 3,845 feet above the sea. Its summit slopes gradually to the southward for 4 $\frac{1}{2}$ miles to Cape Kamilafka, which has on its eastern side a sandy bay named Port Alyzia, where vessels anchor in depths of 8 to 10 fathoms, sand. Cape Kamilafka should not be approached nearer than 600 yards, the depths off it being irregular.

Vurko Bay.—Mytika Point, 1 mile southeastward of Cape Kamilafka, forming the eastern boundary to Port Alyzia and the western extremity of Vurko Bay, is low, sandy, steep-to, and has on it the village of Mytika. Vurko Bay extends eastward 2 miles from Mytika Point, and has a sandy beach bordered by a bank off which the water deepens suddenly. Behind the coast of both bays is an extensive cultivated plain, beyond which the mountains rise abruptly, the three principal peaks being Mount Bumisto, 5,172 feet high; Mount Korphi, 2 $\frac{1}{2}$ miles to the northwest, with an elevation of 5,252 feet; and Mount Kavrulia, 4,605 feet high.

Communication.—Mytika has regular steam communication with Patras. There is overland telegraph connection by Zaverda and Astacos with the European system.

Supplies are obtainable in small quantities.

Anchorage.—Vurko Bay affords excellent anchorage, well sheltered from southwesterly winds by Kalomo Island, in depths of about 12 to 15 fathoms, sand, from 1,000 to 1,600 yards eastward of

Mytika Point, with the eastern extremities of Kalomo and Dragonera Islands nearly in line, and Cape Kamilafka being in line or just shut in with Mytika Point.

The approach to Vurko Bay between Mytika Point and the northern end of Kalomo Island is about 1,400 yards wide with depths of 25 fathoms in the center. Westerly winds, unless strong, do not reach the anchorage, but back around Kalomo Island from the southeastward, thus heading a sailing vessel standing in for the anchorage. A weak current sets eastward.

Kalomo Island is 6 miles in length, in a northeast and southwest direction, with an extreme breadth of $2\frac{1}{4}$ miles, but at $1\frac{1}{4}$ miles from the southern end it is only $\frac{1}{4}$ mile wide. The northern portion of the island is somewhat oval in shape. A mountainous ridge extends along its whole length.

Mount Kalomo, its summit (lat. $38^{\circ} 38' N.$, long. $20^{\circ} 56' E.$), situated near the middle of the island, is flat topped and 2,445 feet high. Equidistant from it on either side ($1\frac{1}{4}$ miles) are the conspicuous Mounts Vuni and Xilo Castro.

The land falls sharply northward of Mount Kalomo, rising again to nearly the same height in a uniform slope to Mount Vuni, 2,225 feet high, overlooking Cape Aspro Gali; southward of Mount Kalomo the slope is more gradual to Mount Xilo Castro, 1,950 feet high, beyond which the land again falls abruptly. The southern portion of the island is much lower, its highest part, nearly 1 mile northward of Cape Kephali, being 890 feet high. The coast is bold and generally steep to all around and may be approached safely anywhere to within $\frac{1}{4}$ mile.

The northeastern end of Kalomo is separated from the coast eastward of it by a channel nearly $1\frac{1}{4}$ miles wide, but narrowed by the Low Rocks, a group 3 feet high, extending 600 yards from the mainland. Between these rocks and Kalomo the depth is over 20 fathoms.

Town—Anchorage.—Kalomo is cultivated and produces excellent wine. The town of the same name on its eastern side has a rudely constructed mole, small in extent, with 3 fathoms water within it, affording accommodation for a few small vessels. There is anchorage northeastward of the mole in 8 or 9 fathoms, but only 400 yards from the beach. Heavy squalls, even in summer, blow from the high land in the neighborhood, and a good scope of cable is necessary.

For any lengthened stay a more protected anchorage, though in deep water, is afforded near mid-channel westward of Provati Islet, where the depths diminish to 30 fathoms; the small indentation of the coast forming Port Leone affords shelter for coasters only.

Kastus Island, $4\frac{1}{4}$ miles long in a northeast and southwest direction, with a greatest breadth of a little over $\frac{1}{4}$ mile, is partly culti-

vated; numerous hills studded with valonia oaks extend throughout its entire length and attain a maximum height of 520 feet near the center. Its western shore is nearly straight, and trends nearly parallel to the east coast of Kalomo Island with a deep clear channel between the islands. The southern and eastern shores are irregular, forming many inlets only suitable for small coasters.

Port Saraceniko on the west side of Kastus, about 1.7 miles from its northern end, having an islet at its head, and Port Kastus nearly abreast to it on the east side of the island, where the village of that name is situated, are those principally used. The mill on top of the low ridge separating them appears conspicuously on the sky line and serves to point them out.

Prasons Islet, 26 feet high, covered with low scrub, lies close off the middle of the eastern side of Kastus. Provati Islet, 140 feet high, is 250 yards from its northern end, with deep water between. Provati Islet is 1,200 yards from the nearest part of Kalomo Island, off which are some conspicuous rocks, 5 feet high.

Formicula Islet and Shoal.—Nearly 1 mile southwest from Cape Kephali at the southern end of Kalomo Island, is the islet of Formicula, 45 feet high, flat-topped and nearly 800 yards in length, and with a depth of 30 fathoms in mid-channel between them. A large rock above water lies off the southeastern point of the islet, and another close to its northeastern point.

Formicula Shoal, situated 1 mile 267° from the southern extremity of Kalomo Island and 343° 1,400 yards from the northeastern point of Formicula Islet, is about 500 yards in length and 100 yards in breadth, with a least depth of 2 fathoms, rock, sand, and shells; $\frac{1}{2}$ mile 241° from it, is a 5-fathom patch, steep-to.

The mill on Kastus Island on with the south extremity of Kalomo, bearing 110° , leads northward of the shoals; the whole of Vromona Island open southwestward of Formicula Islet leads westward of them.

Formicula Islet Light is shown from a white iron tower with red band, on a concrete base, 10 feet high, on the summit of Formicula Islet. See Light List.

Atoko Island, 1,095 feet high, 2 miles in length northeast and southwest, $1\frac{1}{2}$ miles in breadth, and steep-to all round, is situated $3\frac{1}{2}$ miles from Formicula Islet. Its three conspicuous peaks, all nearly the same height and situated near the extremities, form excellent landmarks, the two highest being near the southern end.

The island is mostly covered with brushwood, but a portion is cultivated. On the southern side is a bay, where there is a well of fresh water and a small church.

Coast—Cape Turkovekla (Marathia).—From the eastern end of Vurko Bay the coast trends southward for 10 miles to Cape Turkovekla, 447 feet high, with an abrupt slope, forming the west point of entrance to Dragamesti Bay. With the exception of the low rocks southeast of Vurko Bay, the coast is, in general, steep-to, with a few off-lying rocks all close inshore, the land behind being thickly covered with wild olive and valonia oak trees, and backed by high mountainous country, sparsely inhabited.

Cape Turkovekla is steep-to, and the channel between it and Kalo-yeros Islet is clear of danger.

From Cape Turkovekla the coast turns sharply into the little bay of Marathia, $\frac{1}{2}$ mile broad and deep. From Metaxoto, the eastern point, the general direction is northeasterly to the head of Dragamesti Bay.

Aspect.—The appearance of the country bordering the sea is hilly for 5 miles to the southward of Cape Turkovekla; it then changes to flat marshy plain, from which rise abruptly a succession of small hilly tracts, similar in appearance to the islands which front the coast.

Dragonera Islands is the general name for the numerous small islands and rocks off the entrance of Dragamesti Bay, which they shelter from southwesterly winds and sea. They extend over a space of $4\frac{1}{2}$ miles north and south, about 5 miles east and west, and are in general steep-to with navigable channels between. The islands are covered with large stones and scrub with a few wild olive trees, are very hilly and rise steeply from the water; cultivation in patches is carried on during some months of the year on all but the smallest islands, water being obtained from the storage tanks.

Prasa Island, the westernmost of the group, 42 feet high, circular in shape, and 150 yards in diameter, is destitute of vegetation, and composed of rocks and bowlders. The island may be approached with safety to the distance of $\frac{1}{4}$ mile, except from the northeastward, in which direction a narrow rocky ridge extends for 1,600 yards with irregular depths terminating in the Prasa Shoal.

Prasa Shoal, a rocky head having a depth of 5 fathoms, with deep water immediately to the northward of it, is situated with the center of Prasa Island bearing 198° , distant 1,400 yards, and the north extremity of Dragonera Island 94° .

This shoal is connected with Prasa Island by the narrow ledge mentioned above, on which the depths are from 11 to 18 fathoms.

Venerable Banks comprise some small detached rocky patches, with general depths of 11 to 14 fathoms and a least depth of 7 fathoms, situated between 2 and 3 miles northward of Prasa Island; they stand on a raised plateau embraced by the 30-fathom curve, beyond which the water soon deepens on all sides. Custance Shoal of 7 fath-

oms, the shoalest head, lies with the center of Prasa Island bearing 164° distant 2.3 miles, and Mount Velutzi 70° . The northernmost patches lie about $\frac{1}{2}$ mile northwest of this spot with least depths of 11 to 12 fathoms.

Caution.—Much time was devoted to a careful examination of this locality in 1904, yet, from the sudden manner in which all these heads rise amidst the general deep water surrounding them, it is possible that other heads may exist, and it would be prudent for heavy-draft ships to avoid this area. There is a clear channel over 1 mile wide between the southernmost of these patches and Prasa Shoal, when entering Dragamesti Bay from the westward.

Clearing marks.—Oxia Peak in line with Prasa Island, bearing 147° , leads westward, and the west extremity of Stamothi and Lambrino Islands in line, bearing 162° , leads eastward of the Venerable Banks.

Dragonera, the largest of the group, is $1\frac{1}{4}$ miles in length from north to south, and about the same in breadth, the coast line being considerably indented; the highest point (lat. $38^{\circ} 29' N.$, long. $21^{\circ} 02' E.$) is 422 feet above the sea. Dragonera, with Kaloyeros Island, forms the southern side of the northern passage into Dragamesti Bay.

Grant and Davy Banks, with least depths of 7 fathoms on them, are situated, respectively, 1,600 and 600 yards off the north extremity of Dragonera Island, and lie in the track of vessels entering Dragamesti Bay from the northward and westward. There is a deep passage $\frac{1}{2}$ mile wide between them, attention to the bearings of Cape Turkovekla and Kaloyeros Island Light being the principal guides in avoiding them.

Clearing marks.—The eastern extremities of Kaloyeros and Pondiko islands in line, bearing 138° , leads eastward, and the west extremities to Sophia and Vromona islands in line, bearing 183° , leads well westward of both these shoals.

Kaloyeros Island is 128 feet high, about 400 yards in extent, and separated from Dragonera by a channel about 400 yards in width; off the southern point a shallow spit extends for 150 yards. Westward and southwest of Dragonera are the islands, Sophia 145 feet high, Lambrino 205 feet, Filipos 95 feet, and Pistros 145 feet high, the latter having two large trees near the summit. Between Lambrino and Pistros are two patches of rocks above water, and another patch lies off the northeastern point of Pistros.

Kaloyeros Island Light is shown from a white iron tower on a concrete base, 10 feet high, situated on the summit, 128 feet high, near the northern end of Kaloyeros Island. See Light List.

There is a narrow channel leading to the northward inside Lambrino and Sophia Islands, passing between Filipos and Lambrino Islands, and westward of Pistros and the detached rocks, all of

which show above water; all other channels between these islands are obstructed by shallow water.

Carlónisi Island, of circular form, about $\frac{1}{2}$ mile in diameter and 260 feet high, is situated about 600 yards eastward from Dragonera.

Provati Island, 200 feet high and 1 mile in length, is situated to the southward of Carlónisi, from which it is separated by a passage 150 yards in width with a depth of 9 fathoms.

On the western side of Provati, distant about 400 yards, is Chakolonisi Islet, 60 feet high.

The channel between Dragonera and Pistros, on the west, and Carlónisi, Provati, and Chakolonisi on the east, is clear. In using it Vromona Island should be kept just open westward of Stamothi Island, bearing 193° .

Pondiko Island, 215 feet high, is situated 800 yards to the south-eastward of Provati, and the channel between them is the most direct for vessels bound for Astoko in Dragamesti Bay, from the southward. The northwest point is foul for 300 yards from the shore, and when passing the locality Vromona Island should be kept just open westward or touching Wreck Rock. The southeastern and eastern points of Pondiko are also foul, and in rounding the latter, Shag Rock should be kept touching or open westward of the northwest point of Petala Island.

Pondiko Shoal.—A narrow ridge, with mud and weed bottom, having depths under 10 fathoms, extends from the bay northeastward of Petala Island to within $\frac{1}{2}$ mile of Day Rock. Midway between Pondiko and Plaka Bay is a patch on this ridge of $4\frac{1}{2}$ fathoms, and possibly less water (this being the position of Pondiko shoal of $3\frac{1}{2}$ fathoms on former charts). Mount Velutzi in line with Glosa Pogonias, 352° , leads westward of Pondiko Shoal; Kunelli Island on with Shag Rock, 192° , also leads westward of it.

Shag Rock, 6 feet high, lies 500 yards from the northern point of Petala Island, with a deep channel between. A spit with less than 5 fathoms extends 100 yards from its western side.

Sentry Bank, least water found 10 fathoms, lies with Shag Rock, distant 650 yards, touching the north extremity of Petala Island, and the western extremity of Petala Island in line with the middle summit of Dioni Peninsula. It should be avoided by ships of heavy draught, as although the place was carefully examined, the sudden manner in which the head rises from the bottom points to the possibility of the existence of a pinnacle which the lead has failed to discover. When passing the locality, keeping the summit of Dioni well open of Petala Island will lead westward of Sentry Bank.

The summit of Glosa Pogonias touching the east side of Pondiko leads midway between Sentry Bank and Shag Rock.

Wreck Rock, 3 feet high and surrounded by foul ground about 200 yards in diameter, lies 1,400 yards 168° from the southern point of Provati Island. It should not be approached within the distance 300 yards.

Dragonera Islands—Southern group.—This group consists of four islands, forming a chain about $1\frac{1}{4}$ miles in length north and south, separated from each other by narrow and generally deep channels. Cravaris, 80 feet high, shaped like a haycock, the northern and smallest, is situated 1.1 miles from the southern end of Provati; Soros, 100 feet, and Apasa, 55 feet in height, lie to the southward. Stamothi, the southern and largest, is 229 feet high, triangular in form, and lies 3 miles northeastward of Vromona, which island, being nearly 500 feet high, serves as an object of general recognition when coming from the southwestward.

A bank of 11 fathoms lies $\frac{1}{2}$ mile 129° of Stamothi Island, one of 14 fathoms nearly $1\frac{1}{2}$ miles 151° , and another of 13 fathoms about 1 mile 219° from it.

Dragamesti Bay is $3\frac{1}{2}$ miles in length by 2 miles in breadth at the entrance, narrowing within to less than 1 mile. The coast line on its northwestern side is rugged, consisting as it does of the debris from the mountain slopes immediately behind.

The land rises almost precipitously immediately behind the town of Astokos, at the head of the bay, and the summit of Mount Velutzi, 2,970 feet, is only $1\frac{1}{2}$ miles from the wharf. A fixed red light is shown from the pierhead.

Directions.—Approaching Dragamesti Bay from the westward, before getting within 5 miles of Kaloyeras Lighthouse, bring it to bear 102° and keep it on that bearing until Prasa Island bears 180° , then change the course to 96° for the middle of the passage between the lighthouse and Cape Turkovekla. These courses, if made good, lead to the southward of Venerable Banks and Grand Bank and to the northward of Prasa Shoal and David Bank.

Anchorage.—A depth of 20 fathoms will be found at an average distance of 200 yards from the rocks until within $\frac{1}{2}$ mile of the head of the bay, when the water gradually shoals. Good anchorage may be obtained off Astokos in a depth of 9 to 11 fathoms.

Astokos, a town of about 500 houses and 1,800 inhabitants, is situated at the north corner of Dragamesti Bay. The town of Dragamesti is some distance up the valley.

Communication.—A road for wheeled vehicles extends toward Missolonghi through the hills on the south side of the bay. Steamers run between Patras and Astokos and to Corfu once a week, and mails either come up by them or overland on mules via Missolonghi.

Telegraph.—There is a shore wire to Missolonghi.

Supplies.—Water of good quality is led down to the wharf at Astokos in pipes and a short stone pier gives shelter to small coasting craft. The supply of fresh meat and vegetables is not to be depended upon.

Trade.—The exports from Astokos consist of wine, currants, corn, cattle, and the husk of the valonia oak, which is gathered in large quantities on the surrounding hills during the autumn.

Pandelemona is a narrow inlet, with depths of 15 to 25 fathoms, situated on the southeastern shore of Dragamesti Bay. It is 400 yards in width and nearly 1 mile in length, with two small branches near its head, but is too confined for large vessels, although there is plenty of water.

There are a few houses at the head of the northern inlet, which are inhabited during the season for picking the valonia husk, and the coasting steamers call to ship it.

The remains of Paleo Kastro, an ancient fortress, overlook the head of the inlet.

Water of indifferent quality may be procured from the wells at the back of the houses.

Port Plateali—Northern approach.—On the southeastern side of Dragamesti Bay the coast is more indented, the hills behind slope less suddenly, and are not so high. The 20-fathom curve is found very close to the rocks, and the only place from which shoal water extends is at Glosa Pogonias, in the northern approach to Plateali.

Glosa Pogonias (Snipe Point).—This low, rocky, and irregularly shaped point forms the southern extremity of Dragamesti Bay and the western point of the peninsula of Pogonia, which separates the two little harbors of Pandelemona and Plateali; a shoal extends off it for a distance of 400 yards, with less than 3 fathoms water.

Day Rock, having 4½ fathoms water, is situated 1.3 miles 338° from the eastern extremity of Pondiko Island and 1,300 yards 222° from the extremity of Glosa Pogonias. The beacon on Vulcan Point in line with the one on Carlo Glosa, 102°, leads over the rock.

Clearing marks.—The summit of Oxia Island in line with the eastern extremity of Pondiko Island, bearing 169°, leads 200 yards westward of the shoal off Glosa Pogonias, and 400 yards eastward of Day Rock. Stenigonia Beacon, situated on the southeastern side of the entrance to Port Plateali, kept in line with the beacon on Carlo Glosa, bearing 126°, leads southwestward of the shoal off Glosa Pogonias and southward of Day Rock.

The eastern extremity of Stamothi Island in line with the eastern extremity of Provati leads about 100 yards westward of Day Rock. Stamothi, therefore, should not be visible when passing westward of Day Rock. Vulcan Point Beacon, half a point open southward of

Carlo Glosa Beacon, bearing 97° , leads 200 yards southward of Day Rock.

Stenigonia Peninsula Light.—A light is shown on the south side of the entrance to Port Plateali, in a position about 25 yards northward from the Stenigonia White Beacon. (See Light List.)

Port Plateali (Platea).—Separated from Pandlemona by the small hilly peninsula of Pogonia is the harbor of Plateali, between Carlo Glosa and the peninsula of Stenigonia.

The entrance is 500 yards broad and the harbor is of semicircular form, extending 1,650 yards north and south and nearly 1,000 yards east and west.

Plateali being easy of access is largely used by British men of war, and beacons and storehouses have been erected for their use.

Directions.—Approaching Plateali from the northwestward, observe the directions for Dragamesti Bay until abreast Cape Turko-vekla; thence, with Stenigonia white beacon in line with Carlo Glosa red beacon, 126° , between the shoal off Snipe Point and Day Rock. When Snipe Point (Glosa Pogonias) bears 354° , course may be altered to pass Carlo Glosa at a prudent distance, and thence into Port Plateali. The beacons at the head of the harbor in line, bearing 44° , lead through the entrance and up to the anchorage.

This is the snuggest anchorage in the neighborhood and has depths of from 10 to 13 fathoms, good holding ground, thoroughly sheltered. There are no dangers outside the 3-fathom curve.

Climate.—Fever is not uncommon, especially in the hot dry summer months, and if a lengthened stay is contemplated it would be better to anchor outside the limits of this confined bay; inside the harbor the sea breeze, of short duration, may not be expected to reach till past midday.

Coast.—Southward of Plateali the coast line is rocky and indented with several little bays for $1\frac{1}{2}$ miles, when the coast hills suddenly cease and are succeeded by a flat marshy plain, which extends to the Kunevima Hills.

The Kunevima Range rises suddenly from the plain to heights of from 300 to 545 feet, with well marked extremities, in the characteristic manner of all the hilly tracts in the delta of the Aspro Potamo. Such tracts are largely used for grazing cattle, which are shipped at the little Ovria Bay, an inlet of Port Petala.

Petala Island, $2\frac{1}{2}$ miles in length, is hilly and rocky, rising in the center to 832 feet (lat. $38^{\circ} 22' N.$, long. $21^{\circ} 06' E.$), and provides pasture for considerable flocks of sheep and goat; there are also a few small patches of cultivated ground. The western coast is irregular, steep, and rocky, but with deep water close to; the eastern side is also steep and about the center precipitous and of imposing

appearance, the cliffs being 60 feet high, with several caves. Shallow sandy flats, generally covered with a dark weed, separate Petala from the mainland and are the site of numerous fisheries. Close to the island there is a boat channel with about 3 feet of water.

Petala Island Beacon is of white stone and stands on Aspro Point, the southern extremity of the island.

Port Petala is situated between Petala Island and the Kunevima Hills; the entrance is between the southern end of Petala Island and the northern end of Dioni Peninsula and is $\frac{1}{2}$ mile wide.

The anchorage is good and well sheltered, but the depth of water is not sufficient for vessels drawing more than 16 feet to obtain the full advantage. Vessels of greater draft would have to anchor just inside the entrance without shelter from the westward.

Directions.—To enter Port Petala steer to pass the south end of Petala Island at a distance of 400 yards, heading for Glosa Ovrías, the point on the eastern side of the harbor; when Oxia Island is seen open eastward of Dioni Peninsula, steer for the northern extremity of the Kunevima Hills until San Nicolo Chapel on the neck of the promontory which forms the eastern point of Petala Island comes in sight, when steer for the end of the promontory and anchor as convenient.

Port Petala is much frequented by vessels engaged in the timber trade. The logs are rafted alongside from the mouth of the Aspro Potamo (to the southward). The port being situated near the entrance to the Gulf of Patras is the refuge for sailing trading vessels when meeting southwesterly gales near Cephalonia and Zante; also during the heavy southeasterly winds down the Gulf of Patras in the winter season.

Dioni Peninsula is similar in character and appearance to Petala Island, but on a smaller scale. The western side has deep water close to the rocks. The peninsula is connected to the plain on the mainland by a neck of sand and mud.

Directions—Dragamesti Bay from southward, westward of Pondiko.—When within 1 mile of Stamothi Island, in the southern approach, shape course to pass $\frac{1}{4}$ mile eastward of Wreck Rock, and when abreast it steer for the center of the channel between Provati and Pondiko Islands, with Wreck Rock open of the eastern extremity of Vromona Island until Oxia Island disappears behind Pondiko to avoid the foul ground extending northwestward from Pondiko. Thence by keeping within $\frac{1}{4}$ mile of Provati and of Carlonisi (when Stamothi will be shut in), the vessel will pass well to the westward of Day Rock and the shoal off Glosa Pogonias, whence course may be shaped for the conspicuous white chapel on the point about 1 mile to the westward of Astoko. When the south point of entrance to Port Pandlemona bears east the vessel will be

northward of Glosa Pogonias Shoal and may steer up Dragamesti Bay for the anchorage off Astokos.

Channel eastward of Pondiko.—When approaching the northern end of Petala bring the summit of Glosa Pogonias (Snipe Point) in line with the eastern side of Pondiko, bearing 1° , which being steered for will lead midway between Shag Rock and Sentry Bank; or a vessel may pass between Shag Rock and Petala. Thence bring Shag Rock touching the northwest point of Petala and keep them in line, 179° , astern, until the south extremity of Stamothi Island is in line with the southeast extremity of Pondiko Island. Thence, by keeping within $\frac{1}{4}$ mile of Provati and Carlonisi, proceed as before directed for Dragamesti Bay. To pass eastward of Day Rock, when northward of Pondiko, bring the summit of Oxia in line with the east extremity of Pondiko, bearing 179° , astern, which leads between Day Rock and the shoal off Glosa Pogonias. When northward of Glosa Pogonias Shoal steer for the anchorage as before directed.

If bound for Plateali the same directions will apply until the eastern extremity of Pondiko Island is in line with the northern extremity of Vromona Island; these kept in line, astern, will lead across Pondiko Ridge in a depth of 10 fathoms, and straight into Plateali.

The beacons at the head of Plateali Harbor in line, 44° , lead through the entrance and up to the anchorage, as before stated.

At night, after losing sight of Oxia Light, Oxia Peak, Makri Peak, Vromona Island, Stamothi Island, and the summits of Petala Island, are usually noticeable; it is difficult to recognize the other islands from any distance.

From northward of Makri Island, steer for the eastern extremity of Pondiko Island, bearing 28° , until the north extremity of Petala Island bears 118° , or until the west extremity of Pondiko Island is in line with the east extremity of Provati Island. Then steer 50° until the northeastern extremity of Pondiko Island bears 320° , when steer about 5° to avoid Pondiko Shoal.

When about midway between Stamothi and Petala islands, bring Stenigonia Light to bear 37° and keep it on that bearing until within about 350 yards of it, then keep about that distance from the shore and stand into the port.

Current.—A current, setting north-northwestward, has been frequently experienced at the southern entrance to this channel.

Dioni Bay.—The British man-of-war *Goldfinch* during the survey in this vicinity, when resorting to this anchorage on several occasions, found a heavy-breaking swell to quickly rise with westerly and northwesterly winds in a depth of 12 fathoms, Makri Island affording but little shelter. These winds, of moderate strength, may

be expected in the summer season to set in daily by midday, continuing till near midnight.

Aspro-Potamo, or White River (ancient Achelous), runs into the sea after a tortuous course through the extensive plain between the peninsula on the southern side of the entrance to Port Petala and the base of Mount Kutzulari. It averages 100 yards in breadth for 30 miles from its mouth, with $1\frac{1}{2}$ to 4 fathoms water, but with only about 2 feet on the bar. At its mouth is a low grassy island forming two narrow entrances with sandbanks nearly awash on either side, the northern entrance is that principally used; kayaks of moderate size may be constantly seen passing to and fro.

The Aspro-Potamo is the largest river in Greece, and, flowing from a high mountain range, in the winter becomes swollen and inundates the whole plain near the sea, bringing down a large quantity of deposit. These floods as well as the receding of its waters are sometimes very sudden.

The sea breaks on the bar with southwesterly winds, the water being shallow $\frac{1}{2}$ mile from the entrance, but deepening very suddenly beyond that distance. At times the sea is discolored nearly 2 miles from the shore, the line of discoloration being very markedly defined.

Clearing mark.—From the northward, if intending to pass inside Oxia Island, the north extremity of Vromona Island kept in sight southward of Makri Island until the river entrance is passed leads 800 yards off the shoal water of the river bar.

Oxia Bay.—The British man-of-war *Leander* anchored in Oxia Bay in a depth of 15 fathoms, with the extremities of Oxia Island bearing 235° and 195° , Scrophia Islet being just shut in with the coast of the mainland between. The anchorage was found very useful for destroyer work, it being easy of access by night. In blowing weather the squalls from the high land are extremely heavy.

Echinades Islands.—**Vromona Island**, situated 202° distant 3 miles from Stamothi Islet, is nearly oval, one mile in extent north and south, flat-topped, rising to a height of 472 feet at its southern part (lat. $38^{\circ} 22' N.$, long. $21^{\circ} 0' E.$). The island is partly cultivated and inhabited by shepherds.

Makri Island.—The northwestern end of Makri is 1.1 miles eastward of Vromona; the island is 2 miles in length northwest and southeast, but narrow, its greatest breadth being about 600 yards. Makri Hill, 417 feet high, and cone shaped, forms a conspicuous object. About 200 yards eastward of its southeastern end is Kunelli, a steep rocky islet 82 feet high and about 600 yards in length.

The water round these islands is deep; they are steep-to and may be approached to within a prudent distance. A narrow rocky ledge with irregular depths connects Kunelli and Makri Islands, rendering

the channel between them unsafe except for small craft fully under command.

Kunelli Island light is shown from a white iron tower on a concrete base, on the summit of the island. (See Light List.)

Oxia Island, situated on the north side of entrance to the Gulf of Patras, is $2\frac{1}{2}$ miles in length northeast and southwest, of an irregular form, being contracted in the middle to a mere isthmus with a bay on either side, one open to the northwest the other to the southeast. The island is easily recognized by its precipitous rugged appearance, and when first seen appears as two, the northern portion being far the higher with a truncated peak 1,380 feet above the sea (lat. $38^{\circ} 18' N.$, long. $21^{\circ} 07' E.$) and nearly the same height as Mount Kutzulari on the mainland, 2 miles northeastward of it.

On the northern side of the island is a cove, receding about 600 yards, with a beach, and anchorage for small craft in a depth of 11 fathoms. Oxia is steep to all around, and is separated from the mainland by a deep channel 1,200 yards wide affording shelter and anchorage in depths upward of 25 fathoms; its southwestern extremity is named Cape Oxia; it is inhabited by shepherds only. The peak of Oxia, with Mount Kutzulari, form excellent marks for the Gulf of Patras.

Oxia Island Light.—From a gray cylindrical tower with stone dwelling attached, 24 feet high, on the southwestern extremity of Oxia Island, a flashing white light is exhibited 235 feet above the sea and visible 22 miles, between the bearings of 261° and 141° .

The landing is difficult at Cape Oxia, except in calm weather.

Cephalonia—General remarks.—Cephalonia (ancient Kephallinia, the largest of the Ionian Islands, is $27\frac{1}{2}$ miles in length in a northerly and southerly direction from Cape Scala or Monda at its southeastern end to Cape Vlioti on the north, with a varying breadth of $2\frac{1}{2}$ to 19 miles, the bulk of the island lying westward of the line of its extreme length and being irregular in form and deeply indented with bays, of which two, Port Argostoli and Samos Bay, are excellent harbors.

It is very mountainous, a calcareous ridge traversing nearly the whole length of the island; the highest point, 5,218 feet above the sea, is near the southeastern end, and was anciently called Mount Ænos, now Mount Nero or Black Mountain. This mountain was formerly covered with a fine pine forest, portions of which still remain. In continuation of the mountainous ridge to the northward, the heights range from 2,174 to 3,212 feet.

The principal productions are currants, oil, wine, and melons; the latter are celebrated for their size and flavor, frequently keeping good for a long time. Provisions are not plentiful except those of

the commonest sorts; only a few sheep and goats are reared on the island, owing to the scarcity of pasture, the cultivation of the vine being continued almost to the summits of the mountains. Cattle are brought from the mainland.

Communication—Telegraph cables.—There is direct and frequent communication by steamers with the Black Sea, Austria, Germany via Trieste, Italy, and Great Britain. Telegraphic communication is sent via Zante through Otranto, Malta, and Trieste. Telegrams to Russia or the Levant are sent via Zante and Chios. Roads throughout the island are good, having been made during the British occupation; they are still fairly maintained.

The telegraph cables connecting Cephalonia with the general system are, one from the eastern side of Samos Bay to Ithaca, and another leaving the shore about $1\frac{1}{2}$ miles westward of Cape Monda or Scala and landed about $\frac{1}{2}$ mile northwestward of Cape Krionero in Zante.

Population.—There are about 78 towns and villages in the island, and the population is approximately 71,000.

The climate in general is healthy, but intermittent fever is prevalent during summer in the lowlands of one or two marshy districts, especially near Samos, on the eastern side of the island; the only precaution necessary in these parts is nonexposure to the early morning or night air, and the only specific in use is sulphate of quinine.

Quarantine.—There being no quarantine station in this island, vessels arriving from an infected port must proceed either to Corfu or to Trizonia near Patras. Those, however, that are only subject to five days' observation, can perform operations with the usual sanitary precaution.

Cape Vlioti, the northern point of Cephalonia, lies southward 5 miles from Cape Dukato, the southern extremity of Santo Maura. The highland at the northern end of the island terminates in Cape Vlioti, which is low, cliffy, and steep-to, with a rocky shore.

Ithaca Channel—Western shore.—From Cape Vlioti the eastern coast of Cephalonia trends southeastward, the northern entrance to the Ithaca Channel commencing 1 mile northward of Guiscardo Lighthouse, where the coast of Cephalonia approaches that of Ithaca, southward of Oxoi Point, to 1.3 miles; thence, the channel takes a southerly direction for 12 miles to its southern entrance between Cape Dakalia on the Cephalonian shore, and St. Andrea Point, Ithaca.

Agriossiko Bluff, 9 miles southward of Guiscardo Point, is the termination of a spur of the high mountain range immediately over it and is composed of conspicuous steep white cliffs; between this bluff and Cape Dekalia the coast falls back, forming Samos Bay. Nearly

the whole distance to Agriossiko Bluff is irregular, with several coves where boats receive and discharge cargoes of fruit and corn, but which have no other importance. The Ithaca shore is fairly straight.

The narrowest part of the channel is near the northern entrance. At its southern entrance it is 2 miles broad; elsewhere it has a general width of $1\frac{1}{2}$ to $2\frac{1}{2}$ miles, with mid-channel depths of 80 to 90 fathoms, and both shores are steep-to, with the exception of here and there a rocky fringe quite close to the cliffs.

Guiscardo Bay is a small bay in Ithaca Channel, about 2 miles southeastward of Cape Vlioto, the northwest point of the entrance. The bay is about 600 yards deep in a north-northwest direction and 200 yards wide in the narrowest part, where a point projects from the western side abreast the customhouse, within which is a small inner harbor, with a depth of 8 fathoms, good holding ground, but limited space. The village, on the western side, consists of a church and about 35 houses, inhabited entirely by seafaring men, to whom the patches of cultivated land around belong. A few small vessels call here for currants during the season, about 700 tons being exported annually.

In westerly and northwesterly gales, vessels will find shelter in the bay in 11 to 14 fathoms, with the lighthouse bearing about 5° 300 yards; here there is room for a large ship to moor.

Phiscardo Point Light.—On Phiscardo Point, 142 yards within the northern point of entrance to Guiscardo Bay stands a square masonry tower, 47 feet high, from which at an elevation of 90 feet above the sea a fixed white light is exhibited, visible 9 miles. The light shows in all parts of Ithaca Channel to the southward, and becomes visible from the northward when bearing southward of 156° . The lighthouse is conspicuous by day when approaching from Ithaca Channel and marks the entrance to the bay.

Deskalis Islet, about 600 yards from the coast of Cephalonia and $1\frac{1}{4}$ miles southward of Phiscardo Point (Guiscardo) Lighthouse, is about 200 yards in length, flat, 10 feet high, and of a reddish color, with the ruins of an old tower on it. Shallow water extends a little northward and southward of the islet. To avoid the islet at night, keep Phiscardo Point Light a little westward of 326° until certain of being past it.

Directions.—Vessels from the northwestward bound through the Ithaca Channel will first sight the high land of Santa Maura and then the remarkable white patch 2 miles northward of Cape Dukato, Sappho's Leap; next, the high, bold headland of Oxio Point, Ithaca; and, finally, the northern point of Cephalonia which is comparatively low.

Vessels under sail should not enter Ithaca Channel except with a fair wind, as the water is too deep for anchoring should it fall calm,

the currents are uncertain and, at times, terrific squalls blow from the neighboring high lands.

Port Santa Eufemia, or Pilaros Cove.—This cove, $1\frac{1}{2}$ miles southwestward of Agriossiko Bluff, falls in $1\frac{1}{2}$ mile and is 300 yards wide; it affords anchorage for coasting vessels in a depth of 2 to 8 fathoms, the water shoaling gradually to its head. There is a quay and mole, on the head of which is a lighthouse.

It is rarely visited in winter, being exposed to winds from north-east to southeast, which send in a heavy swell. Violent squalls also blow down the deep valley extending westward from the cove.

The village is small, comprising only about 45 houses; the principal feature is the church, said to be the finest in the seven islands. During the summer months, local traders transmit goods across the island to Argostoli from this place in preference to the more mountainous road from Samos, $3\frac{1}{2}$ miles southeastward of Santa Eufemia.

Pilaros Cove Light.—From a small square tower at the molehead in Pilaros Cove, is exhibited, at an elevation of 24 feet above the sea, a fixed white light, visible 6 miles.

Samos Bay, in Ithaca Channel, between Cape Dekalia on the east and the opposite shore on the west, is $2\frac{1}{2}$ miles wide and $1\frac{1}{2}$ miles deep. It is semicircular, sheltered from all winds but those from the northward, and even from that quarter no dangerous sea can rise in so landlocked a position. At the head the bottom is mud and sand and is good holding ground.

Vessels may anchor in depths of 12 to 15 fathoms. A good berth for a small vessel is with the largest house in the village of Samos bearing about southeast, distant $\frac{1}{2}$ mile, and the extremity of Cape Dekalia 47° . Large vessels should anchor farther out. A small mole projects in a westerly direction into 2 fathoms water from near a large house and is used by small craft. During strong winds it is necessary to be prepared for the heavy squalls which blow from the highland.

The village is in the southeastern angle of the bay and is small and straggling. On the summit of a hill eastward of it are the ruins of the ancient city of Samos. An extensive plain, richly cultivated and well watered, extends southward from the head of the bay.

The telegraph cable connecting Cephalonia with Ithaca is landed in the eastern part of this bay.

Samos Light.—A fixed green light, elevated 23 feet above the sea, visible 4 miles, is exhibited from a support over an iron shed on the pierhead at Samos.

Cape Dekalia, the eastern point of Samos Bay, is a bold, bare, rocky headland, easily recognized by a small and remarkable peak over it about 525 feet high and partly covered with bushes.

On the eastern side of the cape is Andi-Samos Bay, about $\frac{1}{4}$ mile deep, but of no importance. A vessel might anchor in this bay in a depth of 10 or 12 fathoms about 400 yards from the beach at its head, but as it is open to the northeast, from which quarter heavy squalls at times prevail, it can only be used as a stopping place during summer.

Ithaca Channel, east shore.—**Oxoi Point** is the eastern point at the northern entrance of Ithaca Channel. It is high and bold, and from a distance westward is seen before the land of Cape Vlioti, of Cephalonia, which is much lower. When seen from the westward it appears as a large round headland with an old tower on its summit. The water in its vicinity is deep and the current perceptible.

Port Polis.—At $2\frac{1}{4}$ miles southward of Oxoi Point is Port Polis. It is circular, 600 yards in diameter, with its entrance 200 yards wide, open southwestward, and directly east of Deskalio Islet. There is a depth of 17 fathoms in the middle of the port, but small vessels anchor near the shore. The hill overlooking it on the north is 870 feet high.

Opis Aito is a small bay with a sandy beach on the eastern shore of Ithaca Channel, $3\frac{1}{2}$ miles southward of Port Polis, communicating with Port Vathi by a road across the Isthmus of Ulysses passing eastward of Mount Aitos, the hill on which are the ruins of the castle. The telegraph cable to Samos Bay leaves the shore in this vicinity.

St. Andrea Point and Port.—At $3\frac{1}{2}$ miles southward of Opis Aito is St. Andrea Point, the southern extremity of Ithaca and the western point of entrance to the little port of St. Andrea, which is 200 yards wide and 800 yards deep, terminating northward at its head in a sandy beach, where small coasters find anchorage. There is a depth of 30 fathoms at the entrance, diminishing to 8 and 3 fathoms near the head. In the vicinity, on the side of a cliffy hill, is the celebrated fountain of Arethusa.

East coast of Cephalonia.—**Agrilios Point**, $1\frac{1}{4}$ miles southeastward of Cape Dekalia, is steep and rocky, with a round knob on it; **Grosso Point**, $1\frac{1}{2}$ miles farther southward, is a steep and remarkable perpendicular rocky cliff rising abruptly from the sea from 100 to 130 feet high; the coast from thence to Pronos Bay, a distance of 5 miles, is nearly straight.

Pronos Bay is nearly $1\frac{1}{2}$ miles wide and recedes about $\frac{1}{4}$ mile; the shore is mostly shingle. Small country vessels anchor occasionally in the southern extremity of the bay where there is a little mole, but with an easterly wind a heavy sea rolls in.

In the southern part of Pronos Bay is a remarkable gorge from 300 to 400 feet high, the outlet for the mountain torrents which empty themselves into the bay during the winter season. The shore for more than 1 mile southeastward of Pronos Bay is rocky; from thence

it becomes steep and clear to Cape Kapri. Cape Kapri, the eastern extremity of Cephalonia, is bold and steep-to; a sharp-topped hill, 543 feet high and partially covered with stunted trees, rises immediately over it.

Cape Dekalia Light, on the cape, is exhibited from an iron column attached to keeper's dwelling, is fixed red, 75 feet above high water, and visible 8 miles. See Light List.

South coast.—**Cape Monda (Scala)**, $3\frac{1}{2}$ miles, about 196° , from Cape Kapri is a bold and remarkable bluff 100 feet high, its face being a steep clay cliff; the land for 1 mile northward of the bluff is low and cultivated.

Kakova Shoal.—The southeastern coast of Cephalonia, from $1\frac{1}{2}$ miles northward of Cape Monda, is bordered by a shallow ridge which surrounds the cape and shore to the westward and projects $1\frac{1}{2}$ miles in a southeasterly direction, terminating in a depth of 4 to 5 fathoms, dropping suddenly to 13 and 24 fathoms, the bottom being rocky and irregular.

There is a patch of 3 fathoms on its western ridge at 1 mile from the cape.

To clear the shoal, give Cape Monda a berth of at least 2 miles.

Between Cape Monda and Cape Cataleo, nearly 2 miles farther westward, the coast forms a bay with a sandy shore bordered by rocks and shallow water. The telegraph cable connecting Cephalonia with Zante leaves the shore in this bay about $1\frac{1}{2}$ miles westward of Cape Monda. Small craft anchor off the little village of Cataleo in the northwestern corner. A heavy westerly swell frequently sets into the bay and sailing vessels should not stand too close in.

From Cape Cataleo to Koroni Bluff, $2\frac{1}{2}$ miles farther westward, the coast cliffs are from 250 to 300 feet high, bold and precipitous, showing remarkably white from seaward, and skirted by sunken rocks.

Loortha Bay.—Between Koroni Bluff and Cape Liakas, which are 6 miles apart, is Loortha Bay, an indentation of about 2 miles; the coast at first consists of steep cliffy points followed by a sandy beach $1\frac{1}{2}$ miles in extent; from thence the general features are white clay cliffs from 50 to 100 feet high for $2\frac{1}{2}$ miles to Cape Liakas, which is a low shelving sandstone point rising gradually to the cultivated land within it; the cape is surrounded for a distance of about 200 yards by detached sunken rocks. With all winds southward of east and west, a heavy swell sets into the bay, accompanied by surf on the beach. With northerly and easterly winds, very heavy squalls blow down from Mount Nero, which rises immediately over it.

Danisti Rock, lying $\frac{1}{2}$ mile 202° from Cape Liakas, has a bare white appearance, and is 8 or 10 feet in height; the sea at times breaks heavily upon it. There is a depth of 7 fathoms between the rock and the cape, but vessels should not use this passage.

Thio-nisi Islet.—Between Capes Liakas and Pelagia, 2 miles farther westward, the shore is low and forms a bay encumbered with rocky patches, with depths of from 1 to 2 fathoms, and deep water between them. About $\frac{1}{2}$ mile from the shore and 1 mile westward of Danisti Rock, is the rocky Thio-nisi Islet, about 200 yards in diameter, 80 feet high, and with a monastery on its summit. Thio-nisi bearing northward of east, clears the tail of the reef extending from Cape Pelagia.

The coast from Cape Pelagia to St. Nikolaos Islet is low and fringed with rocks.

Port Argostoli—Depths.—From the depth of 20 fathoms at the entrance, the water gradually shoals to 4 fathoms about 1 mile from the head of Livadi Bay, some 9 miles from the entrance. Argostoli Harbor on the eastern side has general depths of 9 to 12 fathoms, and is available for all classes of vessels.

Aspect.—The entrance to Port Argostoli is between San Nikolaos Islet on the east, and Vardiani Island on the west, which are $2\frac{3}{4}$ miles apart. About 2 miles farther in are the two points of Lardigo and San Georgios, the former on the east, the latter on the west; from thence, a deep inlet averaging $1\frac{1}{2}$ miles wide, extends $7\frac{1}{2}$ miles northward, the upper part being known as Livadi Bay.

At $2\frac{1}{4}$ miles within San Georgios Point, on the western shore, is the town and port of Lixuri, with a small harbor inclosed by two breakwaters; immediately opposite on the eastern shore is the deep inlet, to the southward forming the harbor of Argostoli, the town of which stands on its western shore.

The land on the eastern side of the port is much higher and steeper than that on the western side, and forms a ridge extending from Mount Kotroni, 791 feet high, at $1\frac{1}{4}$ miles northeast of San Nikolaos Point, to San Theodoro Point, 4 miles to the northward, gradually decreasing in height.

The land on the western side is comparatively low and much more broken until it reaches the central ridges of that part of the island 3 miles distant, the summit of which is 1,478 feet high.

San Nikolaos Point, on the eastern side of entrance to Argostoli, is low and shelving, the ruins of a small watch tower stand $\frac{1}{4}$ mile southeast of the point. A little over 200 yards northwest of the extremity of San Nikolaos Point lies the rocky islet of the same name, irregular in shape, 12 feet high, and about 200 yards in length.

Foul ground surrounds the point and islet, extending 400 yards in a westerly and northerly direction.

A rock covered with 3 feet water, on which the sea breaks except in fine weather, lies 250°, distant 350 yards from San Nikolaos Islet.

The village of Mignies is a little over $\frac{1}{2}$ mile northeastward of the point, with olive groves southward of it, and among the trees is the large and very conspicuous monastery of Mignies, with a white tower, a useful seamark.

Between San Nikolaos Islet and Cape Lardigo the land recedes and forms a bay, everywhere skirted by rocks extending some distance offshore. Sailing craft should avoid standing too far into the bay.

Clearing mark.—The two houses on Cape San Theodoro close east of the lighthouse bearing 357° , and well open of Cape Lardigo, leads westward of the dangers off San Nikolaos Islet.

San Nikolaos Banks, on the east side of the entrance to Port Argostoli, consist of two rocky banks lying in a north and south direction and occupying a space of 1.3 miles. The southern bank with 6 fathoms least water is 1,000 yards long north and south, and 100 yards across within the 10-fathom curve. The northern bank with 7 fathoms least water is 1,200 yards long, and 200 yards across; the bottom between these banks is uneven with depths of 9 to 10 fathoms.

From the depth of 6 fathoms on the southern bank the highest part of San Nikolaos Islet bears 87° distant 1,500 yards, and the extremity of Lardigo Point 6° .

From the depth of 7 fathoms on the northern bank the highest part of San Nikolaos Islet bears 140° distant 1,800 yards.

Clearing marks.—Argostoli signal station in line with Cape Lardigo 16° , leads westward, and Cape Gherogambo Lighthouse, just open southwestward of Vardiani Lighthouse, 304° leads southeastward of San Nikolaos Banks.

Vardiani Island, on the west side of the entrance to Port Argostoli, is 1,300 yards in extent northwest and southeast, and little over $\frac{1}{2}$ mile across the southern and broadest part, which is low and flat; the northern part is a long narrow cliffy projection 67 feet high; in the center are the low white buildings of a monastery and on the southeastern end and lowest part of the island stands a conspicuous lighthouse. The island is surrounded by rocks and shallow water which extend southward from it 600 yards, and westward, nearly $\frac{1}{2}$ mile.

The northwestern end of the island is but little more than 1 mile from the shore and about equidistant from San Georgios Point and Cape Akroteri, which are nearly 3 miles apart, the western part of the coast between them, exclusive of the Akroteri Shoals, being bordered by scattered reefs and rocky patches extending nearly $\frac{1}{2}$ mile off shore.

Vardiani Island Light, fixed white, with red sector, 95 feet above high water, is exhibited from a circular brick colored tower 82 feet high. See Light List.

Cape Akroteri is low and the southern termination of the land forming the western portion of Cephalonia; the point is surrounded by rocks and shallow water, in continuation of the rocky patches from the eastward, which project over 1 mile southward.

Akroteri Shoals are the outer rocky patches, with $3\frac{1}{2}$ and 4 fathoms water, on which the sea breaks occasionally. There are depths of 7 fathoms between these shoals.

The red sector of Vardiani Island Light cover these shoals.

The coast from Cape Akroteri trends in an easterly direction for about 3 miles to San Georgios Point. Between Cape Akroteri and Kse Point, 1 mile eastward of it, the shore recedes and forms Akroteri Bay, which is shallow and encumbered with rocks; the bottom between this and Vardiani Island is uneven and rocky, with several patches of $3\frac{1}{2}$ and 5 fathoms, the general depths being 7 to 9 fathoms.

Vardiani Shoal, with 3 fathoms least water, lies 1,500 yards north of Vardiani Island, and is about $\frac{1}{2}$ mile in extent, with depths of 5 to 7 fathoms close around. From the shoalest part Vardiani Light-house bears 181° distant about 1 mile.

San Georgios Point, north-northeastward, distant $1\frac{1}{4}$ miles from Vardiani Lighthouse, is surrounded by rocks and shallow water, the depth at 600 yards eastward of the point being 5 fathoms.

Kalafati Reefs, on which the sea breaks, extend 1,600 yards 165° from the point, with depths of from 1 to 3 fathoms for the distance of 1,000 yards. From a depth of 5 fathoms at the extremity of the reefs Vardiani Lighthouse bears 222° , distant 1.2 miles. The bottom eastward of the reefs is broken and rocky.

Cape Lardigo, $2\frac{1}{2}$ miles north of San Nikolaos Point, on the east-side of entrance, is 143 feet high; from it to Cape San Theodoro lighthouse, 2 miles further north, the shore forms a slight bay skirted by rocks and shallow water; about midway are patches of 2 and $2\frac{1}{2}$ fathoms which, off the watch-tower under the signal station, extend 800 yards from the shore. The shore itself is backed by a ridge 312 feet high, on which is the signal station communicating with the town of Argostoli on the eastern side of it.

Cape San Theodoro is low, rocky, and surrounded by rocks and shallow water extending 200 yards westward of the point, 300 yards northwestward of it, and as much as 400 yards at some parts eastward of the point.

Sand bank.—A detached sand bank, 350 yards in extent northeast and southwest, with depths of from 4 to 5 fathoms, lies with its southwest extremity bearing west, distant 550 yards from Cape San Theodoro.

Cape San Theodoro Light is fixed white, exhibited from an open tripod, 36 feet above high water. See Light List.

Directions.—Pass not less than 600 yards westward of Cape San Theodoro and give the northwestern and northern coasts of Argostoli Promontory a berth of $\frac{1}{4}$ mile. Vardiani Island Lighthouse in line with St. Georgios Point, 202° , leads westward of the shoal water off Cape San Theodoro, and the blue belfry of the Greek cemetery church open northeastward of Argostoli Promontory, 118° , is a mark for turning eastward into the harbor.

Lixuri.—From St. Georgios Point, on the western side of entrance, to Lixuri mole $2\frac{1}{4}$ miles to the northward, the shore is low and bordered by rocks and uneven ground. The eastern side of San Georgios Point should not be approached nearer than 800 yards, and vessels of deep draft should give it a still wider berth by not going into less than 10 fathoms of water, nor is there any occasion to stand nearer the shore than this depth when northward of the point.

The town of Lixuri, on the low shore on the western side of the approach to Argostoli, contains about 6,000 inhabitants; its trade is greater than that of Argostoli and its position more healthy.

Boat harbor.—Near the southern end of the town a mole projects about 300 yards from the beach in an easterly direction, and then northward for another 240 yards; at 400 yards farther north another mole extends 270 yards to the eastward. These moles form an anchorage for boats and small trading vessels.

Large merchant vessels anchor about 600 yards northeastward of the entrance, in a depth of about 7 fathoms, mud, or farther out, as convenient.

Lixuri Port Light.—A fixed green light is exhibited, at 10 feet above high water, from the north molehead, and should be seen from a distance of 1 mile.

Telegraph cables.—A submarine cable connects Argostoli with Lixuri.

Livadi Bay extends in a northerly direction for a distance of about 5 miles from Cape San Theodoro and Lixuri, with an average width of $1\frac{1}{2}$ miles; there are depths of 14 to 15 fathoms at the entrance, shoaling gradually to 5 fathoms within Quimilya Point, and to 4 fathoms at 1 mile from its head. The eastern shore is bold and steep with deep water close-to; the western is low and sandy with a depth averaging 5 fathoms at from 600 to 800 yards from the beach. There is a wooden pier for boats on the northwestern shore of the bay.

Argostoli Harbor lies between the shore of Argostoli Promontory and that of the high land to the eastward; it extends southward upward of $1\frac{1}{2}$ miles, terminating in the shallow Lake of Kutavos at its head, which lake at its entrance is crossed by the bridge and causeway, 700 yards in length, of the road to Samos.

The harbor is about 1,200 yards wide at the entrance and narrows toward the head. As the western shore is bordered by shallow water, large vessels should keep midway or nearer the high land on the eastern side where the water is deep. The projecting points of the eastern shore of Livadi Bay on with Kokkinos Vrachos 340° astern, leads up Argostoli Bay in depths of 11 to 10 fathoms water until the British consulate bears 258°, when large vessels should anchor.

Nearly the whole of the inner part of the harbor from abreast the northern end of the town is shallow and fit only for small vessels.

Light.—A fixed white light is exhibited, at 9 feet above high water, from a stone beacon surmounted by a lamp-post in 2½ fathoms water, about 300 yards eastward of the shore at the northern end of the town, and should be seen from a distance of about 1 mile. The stone beacon is a truncated pyramid in shape, 5 feet high, and the top is 5 feet square.

The town of Argostoli, the capital of Cephalonia, is on the western shore at the head of the harbor, and is at times unhealthy, owing to the miasma arising from Kutavos Lake, in its close vicinity; it consists of about 2,700 houses, the principal being a small theater and a large communal hospital and poorhouse, to which British subjects are admitted on equal terms with the native population. The inhabitants numbered 10,086 in 1896.

Trade.—The chief exports are currants, wine, and oil. The chief imports are cereals, manufactures (textiles) coffee, sugar, sulphur, petroleum, black cattle, timber, iron and hardware, leather, and tobacco.

Consulates.—The British consulate, prison, statue, and the French and American consulates are conspicuous.

Coal and supplies.—Coal is imported chiefly for the use of mills, about 1,400 tons annually, there being no regular demand for it otherwise. There is none available for vessels.

Good water can be obtained, and is supplied in open boats of about 12-tons capacity. Provisions are good and plentiful, but about 10 day's notice is desirable when large quantities are required.

There are no facilities for repairs to either hull or machinery.

There is a new hospital about 200 yards southward of the British consulate.

The anchorage is about 700 yards eastward of the British consulate, in 10 fathoms water, mud, and good holding ground; moderate-sized vessels go farther in and anchor nearer the eastern shore. The Greek church, with its belfry painted blue and white, and the windmills near the Protestant cemetery on the southeastern shore are good marks. With strong southerly winds vessels anchor under the lee of Cape San Theodoro.

Directions.—Approaching Argostoli from the southward and westward, the summit of Mount Nero, 10 miles eastward of the entrance to the port, may be seen in clear weather from a great distance. On nearing the port, San Georgio's castle, on a hill 1,050 feet above the sea, Thio-nisi Islet, with the monastery on its summit and the white clips of the coast all eastward of the entrance, should be sighted; on the western side is Vardiani Island Lighthouse and the land is lower.

In approaching from the westward the white cliffs in the immediate vicinity of San Nikolaos Island are conspicuous and appear as three; they make an excellent mark; and the southern cliff, which appears wedge shaped, steered for bearing 61° , clears all dangers until the port is open, when a course may be steered up the bay. In entering the port between San Nikolaos Islet and Vardiani Island, all dangers are avoided by keeping in mid-channel; or, if under sail with a foul wind, the clearing marks for the dangers on each side already given must be attended to.

From the southward or eastward through the channel by Zante a vessel should avoid the Kakova Shoal, and passing Thio-nisi and the coast westward of it at a prudent distance, enter in mid-channel as before.

Bound into Argostoli from the northward, after passing the southwestern extremity of Cephalonia at a convenient distance, keep Cape Gheroghambo northward of 320° until the belfry tower of Mignies monastery, in the olive grove on the eastern coast, bears 88° and is in line with a small isolated white house on the crest of the first line of hills near Mignies, when steer for it until Vardiani Lighthouse bears 331° distant about 1,400 yards; then steer 39° for Cape Lardigo and proceed in mid-channel.

At night.—Vessels from the northwestward should not bring Cape Gheroghambo Light to bear westward of 326° and not approach within 2 miles of Vardiani Light until it bears 78° ; then steer about 95° and do not shoal into less than 13 fathoms water in passing the light; when it bears 331° , about $\frac{3}{4}$ mile, steer 39° about 2 miles and then northward midway between Cape San Theodoro and Lixuri Lights. When past Vardiani Light it should be kept westward of 236° until Cape San Theodoro Light bears northward of 16° to avoid Kalafati Shoals.

From the southwestward Vardiani Light should not be brought westward of 309° until within $1\frac{1}{2}$ miles of it; with this bearing and distance steer about 11° for Cape San Theodoro Light and proceed as before.

From the southeastward Vardiani Light should be approached to about $1\frac{1}{2}$ miles, when Cape San Theodoro Light will bear 11° and

may be steered for until the Kalafati Shoals are passed; thence proceed as before.

Coast—Cape Gheroghambo.—From Cape Akroteri, west side of entrance to Port Argostoli, the low shore trends northward about 1 mile, where it becomes interspersed with cliff for $1\frac{1}{2}$ miles farther to Cape Gheroghambo; the shore throughout is irregular and bordered by rocks and shallow water. On the eastern side of the cape is a small rocky bay, and about $\frac{3}{4}$ mile from it is Skisa Point, with its watchtower.

Cape Gheroghambo is rocky, and a reef projects 200 yards southward from it; other rocks lie about the same distance from the shore northwestward of the cape. Mount San Sidaro rises 1,200 yards northward of the cape.

Cape Gheroghambo Light.—From a square yellow masonry tower, with dwelling attached, 51 feet high, on Cape Gheroghambo, an alternating group flashing light is exhibited at an elevation of 164 feet above the sea. See Light List.

Coast.—At Cape Gheroghambo is the commencement of high land which trends north-northeastward 5 miles to Cape Ortholithia, when it turns eastward for about 1 mile, forming the bay of this latter name, with a sandy beach at its head, and open to the northwest. In this bay there is temporary anchorage for small vessels with off-shore winds. The coast from thence continues northward nearly 6 miles farther to Cape Aterra; it is everywhere composed of bold weather-worn cliffs broken by small sandy bays, with here and there scattered rocks near the shore.

Kabbo Point, $1\frac{1}{2}$ miles northward of Cape Gheroghambo, is a peculiar tongue of land projecting westward, and over the high cliffs on its northern side is a monastery. At Cape Ortholithia, and between it and a short mile southward of it, are several rocks above and below water, but close to the coast.

Cape Aterra, the northwestern point of Cephalonia, is a bold, prominent headland with steep white broken cliffs on its western side, and for $1\frac{1}{2}$ miles southward of it are several sunken rocks, some of them nearly 400 yards from the shore. The water along this part of the coast is very deep at a short distance off, the 100-fathom curve being nowhere 1 mile distant from the shore, and at Capes Aterra and Ortholithia scarcely 200 yards.

Port Aterra, between the cape of this name and Cape Kakata, nearly 2 miles to the eastward, is an inlet $1\frac{1}{2}$ miles deep, with steep rocky shores on either side, and a small sandy beach at its head. An islet lies in the middle of the port, and small coasting vessels find shelter close under its lee, but as the water is deep and the inlet open to the northward, without village or inhabitants, it is seldom resorted to.

Gulf of Myrto.—About 4 miles eastward of Cape Kakata is Fort Asso, the coast between falling back 3 miles to the southward and forming the Gulf of Myrto, between steep and precipitous shores with sandy bays at intervals. There is no anchorage, and caution should be observed in a vessel under sail not to get embayed: the wind frequently falls to a calm under the high land, and a heavy swell rolls in from the northwest.

Port Asso (lat. $38^{\circ} 23' N.$, long. $20^{\circ} 33' E.$) is a small inlet between a high double-peaked promontory crowned by the ruins of Fort Asso, formerly an extensive Venetian fortress, and the mainland, with which it is connected by a narrow sandy isthmus. The port is open to the northward, is 400 yards wide and 600 yards deep, and affords accommodation during the summer months to the small coasters which call here for the produce of this well-cultivated district; during winter it is seldom visited, being exposed to northerly winds, which send in a very heavy sea.

Outside the port, there is temporary anchorage in depths of from 13 to 17 fathoms, sheltered from southwesterly winds by the promontory.

The fortress, of considerable extent, is in a tolerable state of preservation and protected on all sides by steep cliffs 440 feet high; it must formerly have been of great strength.

The village of Asso is on the mainland, with a customhouse and health office, and contains about 1,500 inhabitants who carry on a considerable trade in currants, raisins, wine, and oil. Small supplies of provisions and water can be obtained.

The coast from Port Asso trends northward for $5\frac{1}{2}$ miles to Cape Vlioti, the northern point of Cephalonia; it consists of red cliffs from 50 to 150 feet high, with one or two small bays; there are several villages a little inland, backed by well-cultivated ridges. There are two little islets and one or two sunken rocks here and there close to the shore; with these exceptions the coast is steep-to.

For the description of the eastern coast of Cephalonia, see Ithaca Channel.

Ithaca.—This island retains its ancient name, and there is perhaps no place where the influence of classical associations is so lively or so pure. It is nearly 13 miles in length north and south, with an extreme breadth of 4 miles; is mountainous and nearly divided into two distinct islands by the Gulf of Molo on the eastern side, the northern part attaining the height of 2,066 feet in Mount Anoge and the southern half, 2,135 feet, in Mount Stephano.

Currants are grown in large quantities, its wine is excellent, which, with a little oil, are its only exports. The inhabitants number about 12,000, many of whom lead a seafaring life.

Telegraph cables.—The island is in telegraphic communication with Santa Maura and also with Cephalonia. The cable from the former is landed in Aphales Bay and the cable to the latter leaves the shore at the southern end of the Isthmus of Ulysses and crosses the Ithaca Channel to Samos Bay.

Coast.—In general the coast is rocky, with several indentations where country boats find shelter. The western coast runs nearly straight and parallel with the northeastern coast of Cephalonia, from which it is separated by the Ithaca Channel, varying from 1.3 to 2.5 miles in width. The eastern coast is irregular, and, near the middle, the Gulf of Molo trends southwestward about $3\frac{1}{2}$ miles, nearly cutting the island into two at its head and leaving an isthmus only 800 yards across between it and Ithaca Channel.

The shores of the Gulf of Molo are steep and rocky and the water deep. On its eastern side is the entrance to Port Vathi and at its head is the anchorage of Ex Aito Bay. During gales from southwest to northwest the squalls blow down through the deep gullies of the highland with violence. In these gales vessels unable to enter Port Vathi will find anchorage in Ex Aito Bay, where the squalls are not so heavy.

Aphales Bay.—About 2 miles northeastward of Oxoi Point, east point of entrance to Ithaca Channel, is Marmaka Point, the north extremity of Ithaca. Between the two points is Aphales Bay, $1\frac{1}{2}$ miles deep, open northwestward, with a sandy beach at its head, and beyond it the village of Oxoi; the eastern shore of the bay is a steep cliff terminating in Marmaka Point.

Marmaka Point is a sharp projecting point, clear of danger and steep-to, and on its eastern side is a cove. At $1\frac{1}{4}$ miles southeastward of Marmaka Point is San Nikolo Point; the coast between is high and steep-to.

San Nikolo.—On the southern side of San Nikolo Point is the little port of that name, circular, 400 yards in diameter, and with a sandy beach; it is fronted by a small islet and two sunken rocks, the entrance, which is along by the northern shore, being about 200 yards wide; within there is an anchorage for small vessels in 5 fathoms. The water around the shore of Frikes Bay is deep and a short distance from it, but within the bay there are depths of from 30 to 70 fathoms.

Point San Nikolo Light, shown from an iron beacon with white and red bands on masonry base, is group flashing, 46 feet above high water and visible 11 miles. See Light List.

Port Frikes.—About $1\frac{1}{2}$ miles southeastward of San Nikolo Point is the termination of a tongue of land projecting to the northward; between the two points is a bay receding $1\frac{1}{2}$ miles, and at its head

is the little port and village of Frikes, with anchorage in 3 fathoms water. Near the village are remains of ancient ruins.

The shores of Frikes Bay are irregular, and small inlets afford two or three anchorages for coasting vessels.

Port Kioni, situated about 1 mile southward of Frikes Bay, is open to the northeast, 600 yards wide at the entrance, 1,200 yards deep, and clear all around; on its northern side is a remarkable round hill, and on its southern point of entrance are two windmills, by which the position of the port may be known. The village is at the head of the port, where the least depth of water is, from 2 to 4 fathoms, close-to; in the middle the depths are from 20 to 30 fathoms.

Between the southern point of entrance to Port Frikes and the entrance to Kioni, there is a shoal with 5 fathoms water about 400 yards from the coast.

Gulf of Molo.—About 1 mile southeastward of Port Kioni is Cape San Elias, the northern point of the Gulf of Molo. The cape is steep-to, and near it not much above the sea is a white chapel; farther in on the highland is a windmill; from the cape the coast trends south-southwestward 4 miles to the head of the gulf.

Skino Point is the southern point of entrance and is $2\frac{1}{2}$ miles from Cape San Elias; the point is the termination of a tongue of land forming a chain of low hills and $\frac{1}{2}$ mile southeastward of it is a large rock or islet close to the shore, with shallow water extending 100 yards outside it.

The Island of Atoko, 5 miles northeastward of Cape San Elias, serves as a mark for the position of the gulf.

The land on the northwestern side of the gulf is high and rises in ridges with deep ravines, and the coast is straight and everywhere steep-to. On the southern and eastern shores are three separate anchorages, Skino Bay, Port Vathi, and Ex Aito Bay.

Skino Bay.—About $\frac{1}{2}$ mile southwestward of Skino Point is Nera Point, and $\frac{1}{4}$ mile beyond it is Andrea Point; between Skino and Nera Points is Skino Bay, open northwestward and $\frac{1}{2}$ mile deep, with Neios and Skyro Coves, two little sandy bays in either corner, at the head. In the middle of the bay the depth is from 32 to 40 fathoms, and about 200 yards from the beach in either cove there is 20 fathoms. The hill over the bay on its southern side is 553 feet high and rises 900 yards from Andrea Point.

Lights.—Near the extremity of Andrea Point, north side of the entrance to Port Vathi, is a small white circular tower, from which is exhibited at an elevation of 30 feet above the sea a fixed white light, visible 6 miles.

Near the hospital in Port Vathi is a stone column, from which is exhibited, at 13 feet above the sea, a fixed red light, visible 2 miles. See Light List.

Port Vathi, on the southeastern side of the Gulf of Molo, is a snug, land-locked little basin. The entrance may be known by the lighthouse on Andrea Point on the northern side and by the small rocky islet Katzurbo-nisi on the south; the channel in, from the northern end of the islet is 1,200 yards in length, and narrows to barely 250 yards in width, with depths of 36 fathoms decreasing to 21 fathoms.

Within, the port is 1,100 yards long and 300 yards wide, but it narrows and shoals rapidly toward the head, the depth of water, except near its head, being from 10 to 17 fathoms, mud bottom.

On the southwestern side of the port, is a square islet on which is the prison, formerly a lazaretto, and harbor light before alluded to; the water between it and the shore is shallow.

There is a pier, with 6 feet water alongside, on the northeastern shore of the port, just southward of the point charted eastward of the Prison Islet, which point apparently does not exist.

The main landing pier, close to the police and health office, has 6 feet water alongside.

There are bollards along the sea front from the main landing pier to a position southward of the Prison Islet, and thence there are ring bolts on the shore of the bay westward of the islet.

The town, which encircles all the southern and southeastern part of the port, consists of white houses built of stone and is clean and neat, with well paved streets. The principal part of the town is not much above the level of the water, but, on the western side, many houses are erected on the ascent of the hill. At the back of the town are large gardens and currant grounds.

The population is about 5,500, a large proportion of whom lead a sea-faring life. Small quantities of provisions may be procured, but water is scarce.

Anchorage is reserved for men-of-war in the bay westward of the Prison Islet; it is recommended by the captain of the port as being the best sheltered position from the heavy southwest to northwest squalls. The bottom is steep-to along the shore of this bay, 6 fathoms being obtained within 25 yards in many places.

Vessels anchored here should be secured by the stern to the ring bolts above mentioned, which are good and sunk in 9 feet of concrete and rubble; the holding ground is good.

Wind.—The wind usually freshens about 4 p. m., and lasts, with heavy northwesterly squalls from the mountains, till about 8 p. m.

Ex Aito Bay is the inner anchorage in the Gulf of Molo and lies at its southern extremity at the foot of Mount Aitos, a round hill 400 feet high, which rises in the middle of the Isthmus of Ulysses uniting the two parts of Ithaca; along the head of the bay is an extensive

beach, off which 400 to 500 yards there is anchorage in depths of from 14 to 19 fathoms, sand; farther out the water is deep. On the summit of the hill are the ruins of the castle of Ulysses.

Coast.—About $2\frac{1}{2}$ miles southeastward of Skino Point, at the entrance to the Gulf of Molo, is the projecting point of Sarakaniko with a bay on its southern side, but with no anchorage; it being open to the southeast. About $2\frac{1}{4}$ miles farther southward is Iganni Point, the southeastern extremity of Ithaca; between the two points is Parapigadi Islet about 800 yards in length and 200 yards from the coast, with 2 fathoms water between it and the shore; small coasters anchor in this narrow passage which is known as Port Lia. There is nothing remarkable from Skino Point southward, the coast is irregular and the water everywhere deep.

CHAPTER XIII.

THE ISLAND OF ZANTE, GULFS OF PATRAS AND CORINTH, AND COAST OF THE MOREA FROM CAPE PAPAS TO CAPE MATAPAN.

Zante—General remarks.—This island (ancient Zakynthos) is separated from Cephalonia by a deep and clear channel, 8 miles wide. Its extreme length between Cape Skinari on the north and Cape Ieraki, its southeastern point, is $19\frac{1}{2}$ miles in a northwest and southeast direction; its extreme breadth is about 9 miles. Its western part is mountainous, the greatest height, Mount Vrachonis (lat. $37^{\circ} 49' N$, long. $20^{\circ} 42' E$.), being 2,724 feet above the sea; the eastern part is mostly an extensive plain covered with olive groves and richly cultivated vineyards. Mount Skopo, 1,621 feet high, is a remarkable isolated conical peak, the ridge extending from it terminating 4 miles southeastward of its summit in Cape Ieraki, the southeastern extremity of the island.

Traces of volcanic agency are visible in many parts of the island and it is subject to severe earthquakes.

The chief produce of the island is currants and wine, olives, oil, and soap.

The population of Zante by the census of 1907 was 42,502.

Cape Skinari, the northern extremity of Zante, distant 8 miles from the nearest part of Cephalonia, is bold, cliffy, about 200 feet high, appears flat on the surface, and has deep water close-to. From the cape, the eastern coast of the island trends southeastward, with an inward curve for $12\frac{1}{4}$ miles to Krionero Point, the northern extremity of Zante Bay.

Light.—On Cape Skinari stands a circular lighthouse with dwelling attached 30 feet high, from which, at an elevation of 218 feet above the sea, is exhibited a white flashing light, visible 20 miles between 68° and 313° . (See Light List.)

East coast of Zante.—San Nikolo Islet, $1\frac{1}{2}$ miles southeastward of Cape Skinari, is about 200 yards from the coast and covers a cove suitable for boats. Nearly 2 miles farther on is Katastari Point, projecting northward and forming a bay open in that direction, fit only for small coasters. This coast is rocky with cliffs, and just northward of Katastari Point is a large rock, 10 feet high, close to the shore.

Next follows Alilas Bay, receding about 1 mile and having a beach more than 2 miles in length, with salt pans near the shore at its head, from whence the extensive valley or plain extends southeastward throughout the southeastern part of the island. With offshore winds, there is good anchorage in Alilas Bay about 1 mile from the shore in depths of 10 to 14 fathoms, good holding ground; small vessels anchor closer in. From Alilas Bay a range of small hills and slightly irregular shore, with cliff and beach, bordered by shallow water extending some distance off, trends southeastward to Trenta Nove, a small round islet close to the shore, 84 feet high, with a chapel on its summit.

Krionero Point, rather low and surrounded by shallow water to the distance of about 500 yards, has near its extremity a quadrangular yellow lighthouse 25 feet high; the land from the point gradually rises to the Castle Hill.

Light.—From the lighthouse on Krionero Point is exhibited, at an elevation of 75 feet above the sea, a fixed and flashing light, visible 11 miles, between 132° and 319° . (See Light List.)

Zante Bay, between Krionero and Davia Points, is 3 miles wide, semicircular, and recedes $1\frac{1}{4}$ miles. In passing Krionero Point from the northward, the town and castle of Zante open out and have a very pleasant and picturesque aspect.

The mole projects nearly 600 yards southeastward of the middle of the town front, affording shelter to small vessels against the strong northeasterly or gulf winds, which at times send a heavy sea into the bay. There are depths of 10 to 14 feet along the inner part of the mole; the molehead is steep-to, with 29 to 30 feet close around:

A small breakwater projects eastward from the vicinity of San Dionisio Church, near the mouth of the San Caralambo River, from which stream much silt is deposited in the harbor.

Light.—On the molehead, from an iron pillar, painted red, a fixed red light is exhibited at an elevation of 30 feet above the sea, visible 6 miles.

Dimitri Shoal.—The southern shore of the bay is bordered by shallow water, and is rocky in places. At about 1,000 yards 115° from the molehead, and the same distance from the nearest shore, is the northeastern end of this rocky shoal, which is rather less than 200 yards in extent northeast and southwest, and with 7 feet least water. It sometimes is marked by a white buoy, in 6 fathoms, 100 yards from its northeastern edge.

Directions.—Vessels from the northeastward bound for Zante Bay should give Krionero Point a wide berth, as a rocky shoal extends some 500 yards offshore. The first hill southward of the northern extremity of Zante should be kept well open of Trenta Nove Islet until the southern bastion of Zante Castle (Citadel) is open of the

eastern bastion, and the point should not be rounded in less than 15 fathoms water.

From the southward, give Vasiliko Point a wide berth and keep Trenta Islet open of Krionero Point; when the molehead bears westward of 286° and is on with the southern end of the castle, a vessel is well clear of Dimitri Shoal and may steer into the bay.

Caution.—Care is necessary when navigating near these shores, as the buoys marking the shoals are often out of position and the lights are not altogether reliable.

Anchorage.—Zante Bay is exposed to winds from north, round by east, to southeast. The usual anchorage is northeastward of the molehead in a depth of 7 to 10 fathoms, mud and sand. Small vessels anchor off the molehead, in 5 or $5\frac{1}{2}$ fathoms, sandy mud.

A fair berth for a large vessel, in about 10 fathoms, is with Krionero Point Lighthouse bearing 334° , and the molehead light 227° .

Telegraph cables—Buoys.—Telegraph cables are laid from Zante to Otranto, Corfu, Cephalonia, Patras, Cape Trepito, Katakolo, Crete, and Malta. Ships anchoring in Zante Bay must be careful to avoid fouling them. The cables belonging to the Greek Government leave the shore about $\frac{1}{2}$ mile northwestward of Krionero Point and are well clear of the anchorage, but in the bay itself four telegraph cables leave the shore at the telegraph office, about 900 yards northward of the molehead light, in a northeasterly direction, three of them turning in westward round Krionero Point, the fourth, the Malta cable, turning out southeastward into deep water. One buoy moored about 1,400 yards northeastward of the mole light marks the telegraph cables.

The town of Zante extends in a semicircle along the shore of the bay for about $1\frac{1}{2}$ miles, is well built and clean, with several churches and fine old Venetian buildings; the pratique office, custom house, and post office are near the inner end of the mole. The population of the town is about 16,000.

At the foot is Davia Point, which is bluff, skirted by rocks, and is the termination of the sandy beach extending along the southern shore of the bay, of which it is the southeastern extremity.

Zante has ample means of communication, and it is the focus of the telegraphic system of this part of the Mediterranean.

Trade.—The exports are currants, pyrene and olive oil, and soap. The imports are cereals, cotton and woolen goods, salt fish, iron, sugar, coffee, timber, etc.

Consulate.—A British vice consul is stationed at Zante.

Quarantine.—Vessels arriving from suspected ports perform their quarantine of observation here; but those from infected ports are sent to Corfu, Trizonia, or Delos to perform their quarantine.

Hospital.—There is a municipal hospital at which sailors are received by consular request; payment for board and medicine is required.

Coal and supplies.—The quantity of coal in stock varies considerably, but may amount to from about 1,400 to 2,000 tons. Destroyers could coal alongside a wharf at the inner end of the mole. Provisions and all other necessities may be obtained. Water is supplied by tank vessels and lighters.

Coast.—**Vasiliko Point**, 3 miles southeastward of Davia Point, is a low tongue with sandy beach on either side and shallow water surrounding it at the distance of $\frac{1}{4}$ mile; between the two points the coast is bordered by a bank with sunken rocks here and there.

Cape Ieraki, the southeastern extremity of Zante, 2 miles southward of Vasiliko Point, is a low cliff with the ruins of a house on its summit. As this point is low and is the termination of Mount Skopo, from which it is distant nearly 4 miles, it is necessary at night or in foggy weather to be cautious in rounding it, as, from the southwest, the mount appears isolated.

Southern coast of Zante.—Between Cape Ieraki and Cape Marathia, 8 miles westward of it, the coast recedes 4 miles, forming a bay in which are the two islets Peluso and Marathonisi. The land of Mount Skopo bounds the eastern side of the bay, and that of Mount Kieri the western side; at its head is a sandy beach, beyond which is the extensive cultivated plain which is the leading feature of the eastern part of the island. On the western side of Cape Ieraki is a small circular cove followed by a cliffy shore as far as the sandy beach; from the cape this shore is everywhere bordered by shallow water and scattered sunken rocks; it is also shallow all around the beach for some distance offshore.

The bay is seldom visited by vessels as the holding ground, being sand and rock, is bad.

Peluso Islet, lying about west-northwest, distant 1.7 miles from Cape Ieraki, is a picturesque islet about 800 yards in length, 282 feet high, and terraced in places, with fruit trees and brushwood. On its northern side is a monastery in a sandy cove.

About $\frac{1}{4}$ mile west by north of the islet is a shoal with two rocky heads about 1,200 yards apart and steep-to; the northern head has 1 fathom water upon it, the southern head $2\frac{1}{4}$ fathoms.

Kieri Bay.—**Marathonisi**, in the western part of the large southern bay, is about $\frac{1}{4}$ mile in length northwest and southeast, 488 feet high, with an old tower on its summit, steep, with cultivated terraces, and here and there olive trees.

The islet is connected with the mainland of Zante on its northern side by a rocky reef having from 1 to 3 fathoms water, and thus forms with the coast on the western side, distant $\frac{3}{4}$ mile, Kieri Bay.

In the northwestern part of the bay is Port Kieri, off which there is anchorage, in a depth of 7 fathoms, $\frac{1}{2}$ mile from the shingle beach.

Cape Marathia.—The coast from Port Kieri trends southeastward for $1\frac{1}{2}$ miles and then curves southward and westward round the foot of Mount Kieri, the limestone ridge 1,450 feet high immediately over it, of which Cape Marathia is the southern extremity; the coast of the cape is bold, rising in steep cliffs, with deep water close-to.

West coast of Zante.—From Cape Marathia the coast turns suddenly northwestward in bold rugged cliffs from 100 to 300 feet high, for 14 miles to Vromi, a small cove about 600 yards deep with steep cliffs, where fishing boats occasionally resort.

The little rocky islet of Aggi Yanni, 110 feet high, is on the northern side of the entrance to the cove and is connected by rocks with the coast. At $4\frac{1}{2}$ miles beyond the islet and about $3\frac{1}{2}$ miles from Cape Skinari is a little projection of the coast with the ruins of a church on it; the cliffy coast continues to the cape. The water all along the western coast of Zante is very deep, the 100-fathom curve running from less than $\frac{1}{2}$ mile to little more than 1 mile from the land.

Montague Rocks (lat. $37^{\circ} 55' N.$, long. $21^{\circ} 00' E.$), in Zante Channel, within the depth of 5 fathoms, extend over a space of 1,000 yards in a north and south direction, and is steep-to. The least depth found, $2\frac{1}{2}$ fathoms, lies with Kaufkalida Island bearing 74° , distant 6 miles.

The southern patch, with $3\frac{1}{2}$ fathoms, lies 750 yards from the least depth.

These dangers should be given a wide berth, especially by sailing vessels, as the current, with southerly winds, is strong in their vicinity.

Cape Katakolo in line with Cape Trepito, 142° , leads nearly $1\frac{1}{2}$ miles northeastward of the rocks.

Krionero Point light bearing 204° leads 1 mile westward of them, and bearing 224° nearly the same distance eastward.

Strovathi Islets (ancient Strophades) are two small rocky islets lying 162° , distant 25 miles from Mount Kieri, at the southern end of Zante.

Stamphani, the larger islet, is nearly 1,400 yards in length east and west, and on its steep western end, the highest part, is a lighthouse. The coast of the islet is rocky with cliffs; not far from a cove about 400 yards westward of the northeastern extremity, is a fortified monastery of white stone about 88 feet high, with a flagstaff on it. This building can be seen in clear weather from a distance of 12 or 13 miles. Stamphani is supplied with water from some remarkable springs.

Harpy, the northern islet, is much smaller and lower than Stamphani, and is separated from it by a space of 700 yards; its north-western part terminates in a low sandy tongue.

The two islets are connected by a shallow ridge with numerous rocks above and below water and extending 600 yards southwestward from Harpy Islet and from thence around the western point of Stamphani. These rocks choke the passage between the two islets except for boats, though a vessel of light draft might thread her way through in fine weather. Around these islets and rocks at a short distance the water is very deep.

Temporary anchorage.—There is indifferent anchorage on the eastern side, northward of the monastery, in 7 to 15 fathoms water, sand and weed. It should be approached with care, as the water is deep, the 50-fathom curve passing about 600 yards from the north-eastern extremity of Stamphani. The landing place is in the cove near the monastery, where there is a boat slip and pier.

Light.—The lighthouse at the summit of the west end of Stamphani Islet is a white square building 36 feet high, from which is exhibited, at an elevation of 127 feet above the sea, a light. (See Light List.)

The Gulf of Patras may be said to commence at Oxia Island on the north and at Cape Papas on the southeast, which are 13 miles apart. The northern coast from Oxia Island to the entrance of the Gulf of Lepanto is $31\frac{1}{2}$ miles in extent, whilst from Cape Papas to the entrance of that gulf the distance is only $20\frac{1}{2}$ miles, the land between on the southern side receding and forming a bight about $6\frac{1}{2}$ miles deep. The shores on either side are generally low, but backed by high land, and the depth in the entrance nowhere exceeds 30 fathoms, though within it there is, in places, over 70 fathoms.

Northern shore of the gulf—Scrophia Point and Shoal.—Scrophia Point, at the northwestern side of entrance to the gulf and 2 miles eastward of the southern end of Oxia Island, is low and sandy, and within it is an extensive lagoon and fishery. A narrow strip of land, forming the southern part of Port Scrophia, projects northward from Scrophia Point, terminating in Lookout Hillock, 127 feet high, which from a short distance appears as an island.

Port Scrophia is now only fit for boats, but about a century ago was sufficiently deep for large brigs. It has been filled in by the alluvium brought down by heavy rains.

Scrophia Point is surrounded by an extensive sandy shoal, with less than 3 fathoms water, shoaling suddenly from 8 fathoms off its south extremity, which is steep-to. The shoal extends 1.1 miles southward of the point and about $\frac{3}{4}$ mile off the shore eastward of it.

Clearing mark.—The western summit of Petala Island, the north summit of Dioni Peninsula, and the northeast extremity of Oxia

Island in line, 346° , leads 800 yards westward of Scropha Shoal, and Cape Oxia, bearing northward of 298° , leads southward of the shoal.

Mount Kutzulari, a sharp isolated hill 1,424 feet high, rises $1\frac{1}{2}$ miles northward of Scropha Point, and in conjunction with the northern peak of Oxia Island, 1,380 feet above the sea and 2 miles farther westward, forms a good landmark.

The coast between Scropha Point and Tholie Island, $7\frac{1}{2}$ miles eastward, is very low with sandy hillocks and is covered with brushwood and coarse vegetation; within it are lagoons and extensive fisheries. The water near the shore is shallow, but it shoals gradually.

Scropha anchorage.—There is temporary anchorage in depths of 7 to 12 fathoms about $2\frac{1}{4}$ miles eastward of Scropha Point, and, if necessary, anywhere along the shore. About 4 to 5 miles eastward of the point the shoal water extends 1 mile from the shore, there being only 4 fathoms at that distance.

In approaching any part of the low shore on the northern coast of the gulf, attention should be given to the lead, as there is every indication of the shallows gradually extending southward.

Missolonghi approach—Sosti and Turlide Islands.—Eastward of Tholie Island are the three sandy islets of Kalamurto, Sosti, and Turlide; on the eastern extreme of Sosti stands a white light-house, and at Turlide is a landing pier for Missolonghi, with a light. Here is the health office and custom house.

Lights.—See Light List.

Anchorage.—Between Tholie and Sosti Islands is Turli anchorage, usually taken in a depth of 6 or 7 fathoms, sand and mud; inside the 5-fathom curve, it shoals suddenly. Small vessels anchor in 5 fathoms about 1 mile eastward of Tholie, somewhat protected by that island and by the shallow ground extending nearly 1 mile southward of it. The anchorage abreast the end of Missolonghi Causeway is known as Turlide Anchorage.

Directions.—Mount Zyrgos, 3,100 feet high, bearing 16° , leads to Turlide Anchorage for Missolonghi.

Approaching Turli Anchorage, at night, with Sosti Island Light in sight, showing white, a vessel will pass southward of the shoals extending off Tholie Island, on the port hand, and westward of the shoals extending westward of Cape Papas.

Buoys.—Two mooring buoys for the use of small coasting steamers are placed off the pier at Turlide Island in about $2\frac{1}{2}$ fathoms water; one about 1,200 yards, the other 1,600 yards to the southward from the pier-head.

Missolonghi Lake is an extensive sheet of water with numerous islets and mud banks; the navigation is intricate and only available for boats by the staked passage. Anatoliko Lake, northward of Missolonghi Lake, is reached by a boat channel $1\frac{1}{2}$ feet deep, through

the mud flats; in the middle of the lake is an island, on which is the town of Anatoliko, containing 2,500 inhabitants and connected on either side with the mainland by stone bridges. Fish in large quantities are caught in these lakes.

The town of Missolonghi stands on a low swampy point nearly 4 miles northeastward of Sosti Island Lighthouse, and contains about 6,000 inhabitants; the houses are badly constructed and the streets irregular; there is but little trade.

About 2 miles eastward of Sosti Lighthouse is a small pier; the health office and two or three other houses are near the pier, and from it a causeway leads direct to Missolonghi, $2\frac{1}{2}$ miles distant.

Missolonghi is in communication with other parts of Greece by telegraph, and steam vessels call off the coast regularly.

Consulate.—A British vice consul resides at Missolonghi.

Coast—Bukari Point.—The coast eastward of Turlide or Missolonghi Lighthouse is a low sandy shore with inlets to the lakes and swamps which are here and there staked with fish weirs. Bukari Point, at the western side of the entrance to the Phidaris River, is low and of shingle; on the bench about 1 mile westward of it is a ruin. The beach between the point and house is bordered by shallow water extending about $\frac{1}{2}$ mile southward and steep-to.

Clearing marks.—To pass clear and westward of Bukari Point shoal, keep Sosti Island Light in sight (showing red) bearing northward of 294° , or the same bearing of the lighthouse by day, when abreast or westward of the point.

Phidaris River (ancient Evenos) is navigable in boats for $1\frac{1}{2}$ miles; the water is fresh but muddy. In the vicinity of the coast the land is low, with cultivation and villages here and there; on the west side of the river, for 2 miles from its mouth, it is marshy, but wooded inland; eastward of the river, it is thickly covered with olive trees and partially cultivated as far as the foot of Mount Varasova. The hills northward of the low land are covered with pin trees.

Calydon Bay.—From the mouth of the Phidaris River the low wooded shore trends eastward for $5\frac{1}{2}$ miles to the eastern point of Calydon Bay; it is bordered throughout by shallow water, 3 fathoms and less, to nearly 1 mile from the shore, with a tendency to grow outward. Caution is therefore necessary in this vicinity.

Calydon Bay is a bend in the shore under the southwestern face of Mount Varasova; it affords anchorage for very small craft in the northwestern part, off the mineral spring of Krionero. Water may be obtained from numerous springs running into the bay.

Mounts Varasova and Kakascala.—The low coast is all along backed by high land, and at 10 miles northward of Bukari Point, Mount Zyrgos rises to a height of 3,100 feet; and, to the southeastward, rising immediately over the sea, are the conspicuous mountains

Varasova and Kakascula (lat. $38^{\circ} 22' N.$, long. $21^{\circ} 40' E.$), large masses of rock respectively 3,160 and 3,300 feet high, the latter forming a triangular peak.

Basiliki Bay is separated from Calydon Bay by the steep cliffy termination of Mount Varasova. On the eastern slope of this mountain, near the sea, are the remains of several Hellenic buildings; and, in calm weather, extensive ruins may be seen under water near the cliffs, probably the ruins of the ancient city of Chalcis.

Basiliki Bay is the indentation between the southeastern termination of Varasova and the steep coast of Mount Kakascula, which rises abruptly from the sea; between the two mountains is a deep valley. The bay affords anchorage for small vessels except when the wind blows hard from the Gulf of Lepanto, which causes a heavy surf. Water may be obtained from a clear stream on the eastern shore of the bay.

The Narrows—Rumelia Castle.—From Basiliki Bay the coast for about $2\frac{1}{2}$ miles is the base of Mount Kakascula, then follows a low, broad, sandy beach for nearly $3\frac{1}{2}$ miles to Anti Rhion Point, on which stands Rumelia Castle, north side of The Narrows, or the entrance to the Gulf of Corinth. From about 1 mile eastward of Basiliki Bay the shore is bordered by a bank, which here extends off about 400 yards and continues eastward to Rumelia Castle; but $1\frac{1}{2}$ miles westward of the castle the coast bank extends southward about $\frac{1}{2}$ mile to the 5-fathom curve.

Light.—On Anti Rhion Point, at the southern angle of Rumelia Castle, is exhibited a light. (See Light List.)

Morea Castle stands on Rhion Point, on the southern side of the Narrows, at the entrance of the Gulf of Corinth. From the castle the low shore trends southwestward 4 miles to the mole of Patras.

Southern shore—Cape Papas—Shoal.—Cape Papas forms the southern point of entrance to the Gulf of Patras. It is a low shingle spit surrounded by a reef extending nearly $\frac{3}{4}$ mile westward, and more than half that distance northward, the water deepening suddenly at its edge.

Clearing marks.—Sosti White Lighthouse, bearing eastward of 171° , leads well to the westward of the reef.

East Bluff, $4\frac{1}{2}$ miles eastward of Cape Papas, bearing southward of 118° , leads northward of the reef. At night, Sosti Light, bearing eastward of 17° , showing white, leads westward of Papas Reef; when Cape Papas Light bears 135° course may be altered for Patras.

Light.—Near the extremity of the low sand spit of Cape Papas is an iron column, from which is exhibited, at an elevation of 30 feet above the sea, a fixed red light, visible 8 miles.

Temporary anchorages.—Karavastasi Bay, eastward of Rocky Point, 104 feet high, with ruined tower, affords shelter with westerly

and southerly winds, but it can not be recommended as an anchorage, as the wind frequently, and with scarcely any warning, shifts suddenly to the northeast, and blows furiously with a heavy short sea. Lake Kalogria lies just within the beach of this bay.

Southwestward of Cape Papas, during strong gulf winds, there is well-sheltered anchorage, in a depth of 9 to 12 fathoms, sand.

Current.—In the vicinity of Cape Papas a strong current is experienced, caused almost entirely by the wind; with fresh northeasterly or gulf winds, it runs westward at more than $1\frac{1}{2}$ knots an hour, and eastward with northwesterly winds. An eddy or counter current sweeps round the southern side of the bay, toward or from Patras as the case may be, in the opposite direction to the wind. At Patras, during northeasterly winds, it occasionally runs strongly to windward; and, at times, in moderate weather, the current changes periodically and so regularly as almost to partake of the nature of tidal streams.

Patras Roads and Harbor.—The anchorage for large vessels in Patras Roads is westward of the breakwater or northwestward of San Nicolas Mole, in depths of 12 to 16 fathoms, mud and sand. With the wind from the eastward, commonly called the gulf wind, neither wind nor sea comes home. During autumn and winter, should it be necessary to moor, the anchors should be east-northeast and west-northwest of each other; and, if any stay is to be made, the swivel should be put on, as the winds are variable.

Harbor.—The harbor is formed by three moles, each about 500 yards apart at the base, extending in a northwesterly direction, fronted by a breakwater 1,000 yards in length. San Nicolas, the center mole, about 20 yards in breadth, projects 300 yards at right angles to the beach from about the middle of the town near the health office; Kalavrita, the southwestern mole, about 230 yards in length, is parallel to San Nicolas Mole; and the North Mole juts out about 140 yards abreast the north end of the breakwater. It is proposed to prolong the breakwater about 800 yards in a northerly direction and to construct additional harbor works on the main shore abreast.

When in the harbor both anchors should be down ahead, and the stern secured to bollards on the mole. The anchors should be well ahead, as it blows strongly sometimes from the westward (taking the vessel on the beam), and causes the anchors to come home.

Lights.—For details of the six lights at Patras see Light List.

Pilots.—There are no licensed pilots, but one or two men are in the habit of acting as pilots.

Directions.—There are no dangers in the approaches to Patras, having given a berth to the shore off Cape Papas if coming from the southward, or that off Scropha Point if coming from the northwest-

ward. The castle in ruins on the hill at the back of the town is fairly conspicuous. In the town a structure, two white square towers, is very conspicuous, standing up clear of the houses. A structure with three domes, one larger than the other two, is also quite conspicuous.

The town of Patras (ancient Patræ) is, next to Athens, the largest and most populous town in Greece; it stands on the eastern coast and southern shore of the Gulf of Patras at the foot of Mount Voidias, which, about 7 miles to the eastward, rises to the height of 6,340 feet.

On a hill at the back of the town is a castle, probably on the site of the ancient Acropolis, but it is in a dilapidated condition. Large plains cultivated as vineyards extend on either side of the town.

The town has a population of about 40,000.

Hospital.—There is a municipal hospital at Patras open to patients of all nationalities.

Communication.—Patras is in direct railroad connection through Vostitza and Corinth with Athens and also with Nauplia; in the opposite direction, with Katakolo and Pyrgos. Intercourse by trading steamers is frequent with all the principal countries of Europe and with New York.

Telegraph cables.—The telegraph cables from Zantes are landed at a spot about $\frac{3}{4}$ mile northeastward of San Nicolas Molehead Light-house; those from Patras to Corinth leave the shore at the same place and pass through the strait of Lepanto.

To avoid the telegraph cables, vessels should anchor with the French consulate bearing northward of east by north.

Consulates.—England, France, and the United States have consulates at Patras.

Coal and supplies.—Coal for steaming purposes can be obtained, about 2,000 tons being usually in stock. Water, unfit to drink, can be supplied by water boats.

Provisions are obtainable.

Health.—Patras formerly suffered from fevers, but since the land has been drained and the extensive marshes brought under cultivation the health of the town has greatly improved, though during spring and summer ague is still rather prevalent, and against it quinine is the best specific.

Trade.—During the currant season steam vessels arrive here and take away annually about 120,000 tons of currants, of which about half is shipped in British bottoms. The principal exports are currants, valonia, figs, skins, tobacco, olive oil, etc. The imports are twist, cotton cloths, woolens, silk, iron, hardware, sulphur, timber, etc.

There is no dock accommodation, nor facilities for any but slight repairs to shipping.

Quarantine.—Vessels having to ride out quarantine are sent to Corfu, Trisonia, or Delos.

Winds.—The gulf or northeasterly wind blows nine months in the year in the Gulf of Patras; it is first observed along the northern shore under Mounts Kakasala and Varasova, whose summits at the same time, if the wind is of any force, become capped with clouds. Toward noon the breeze usually reaches the anchorage at Patras, and is succeeded by the land breeze at sunset. In summer the north-west wind or sea breeze occasionally blows fresh. Wind from the southeast is hot and scorching, blows strongly, and shifts gradually toward the southwest, when rain, thunder, and vivid lightning usually set in for two or three days.

Climate.—In the months of July to September the mean maximum temperature is about 82°, though occasionally it reaches 90°. The nights are comparatively cool, temperature about 77°. The wind during the day is generally from the northward, going down about sunset; the nights are calm, or with light airs from the eastward.

The coast between Cape Papas and Patras, a distance of 17 miles, forms a semicircular bay whose shores are generally low and sandy with soundings shoaling gradually toward them. The Kommenitza River, which flows into the gulf about midway, is an inconsiderable stream in summer, but is frequently a violent torrent in winter. During strong gulf winds, after passing Cape Papas and by keeping close in along this shore, vessels carry a strong eddy current to the eastward round the bay toward Patras; the wind also is not so strong along this route, and at times a vessel inshore may be almost becalmed when there is a strong breeze 1 mile outside. By standing across the gulf or along by the Missolonghi shore the full force of the wind is felt and a strong westerly current experienced. In case of necessity there is anchorage all along the southern shore.

GULF OF CORINTH.

General remarks.—This gulf or inland sea extends in a general east-southeasterly direction for about 70 miles from its entrance at the head of the Gulf of Patras, where it is only 1 mile across The Narrows between Points Anti Rhion on the north and Rhion on the south side, thence it increases in width varying from 2 to 5 miles as far as Cape Psaromyta, 20 miles within on the north shore, when it further widens, averaging 9 to 10 miles to the head of the gulf.

The northern shore is irregular and indented with deep bays, but the southern shore is regular from The Narrows to Corinth Bay, both shores are steep-to, and in the middle the depths range from 100 to 460 fathoms. The gulf is surrounded by bold, rugged moun-

tains 4,000 to 8,000 feet high; at the foot of those on the southern shore there are narrow cultivated plains intersected by numerous torrent beds.

The Corinth Canal at its head shortens the distance to Athens from the west coast of Greece by about 150 miles.

Winds and weather.—During the summer the winds are usually light and variable, those from west and northwest are most prevalent, occasionally the wind from northwest blows strongly and raises a considerable sea in the eastern part of the gulf; during the night at this season it is generally calm.

In the western part of the gulf the prevailing wind is from north-east; it usually commences at sunrise and increases in force as the entrance is approached, when it forms the gulf wind of the Gulf of Patras. During the summer, when there is often a fresh breeze in the middle of the gulf, it is calm in the Bays of Salona and Aspra Spitia on the northern shore.

In the winter, winds from east-southeast are most prevalent, and are accompanied by a mild thick atmosphere and rain.

Tides.—The tidal action in the gulf, though small, is regular and clearly marked; range at springs of a little over 2 feet.

Currents.—In The Narrows the current is tidal, turning with the time of high and low water at Trisonia Island on the north shore, setting into the gulf while the water is rising there and out when falling. At springs it attains a velocity of 2 knots, the set and velocity are both much influenced by the prevailing wind if strong. As the gulf widens east of Drepano Point it soon ceases to be felt, and in the middle there is no regular current, but a slight drift is frequently set up by the prevailing wind. There is often a marked current setting close around the prominent capes on the northern shore, caused by the tidal stream setting out of the bays.

The Narrows—Naupaktos (Lepanto).—From Anti Rhion, north side of the Narrows, the shore trends in a northeasterly direction 5 miles to Naupaktos, and consists of a shingle beach bordered by a shallow bank 400 to 600 yards wide. Mount Rigani, 4,828 feet high, lies 4 miles north-northwest of Naupaktos, and on a spur of this mount, 639 feet high, stands the ancient citadel from which the walls diverge downward, inclosing the old town. As viewed from seaward the walls present the form of a triangle with the citadel at its apex. A large portion of the modern town lies outside these walls to the eastward.

Steam vessels call occasionally.

Anchorage.—Vessels usually anchor from 700 to 1,000 yards off the town in depths of 7 to 13 fathoms, but it is not a safe anchorage in bad weather with southwesterly winds. There is a small boat harbor, inclosed by the old walls, but it is very shallow and confined.

A light is shown on old fort at entrance to the harbor. See Light List.

Morno Point.—From Naupaktos the shore trends in a southeasterly direction $2\frac{1}{2}$ miles to Morno Point, thence in a northeasterly direction for 3 miles to a red-colored bluff 64 feet high. About midway between Naupaktos and Morno Point is the delta of the Morno River, ancient Hylætus, the land from which to the Red Cliff inclose the flat cultivated plain of Pilala.

From Naupaktos to the Red Cliff the shore is bordered by a shallow bank from 400 to 800 yards wide, from the edge of which the water deepens suddenly, and after heavy rains it is discolored for 1 mile or more from the delta, and frequently extends round Morno Point.

A rocky patch, with $3\frac{3}{4}$ fathoms, lies south from the Red Cliff, 1,500 yards northeastward of Morno Point, and 1,300 yards from the shore.

Light.—On Morno Point, from an iron column on a basement of white masonry, a fixed red light is exhibited at an elevation of 46 feet above the sea, visible 7 miles.

Drepano Point lies $3\frac{3}{4}$ miles eastward of Rhion Point, on the southern side of the entrance to the gulf; the shore between them is a low sandy beach in which are two bays. Drepano Point projects northward toward Morno Point and is of low alluvial land with a spit extending 600 yards northwestward and terminating in a rock awash, with deep water chose-to.

About $1\frac{1}{4}$ miles eastward of Drepano Point the low shore ceases and high land continues the whole of the distance to the bay of Corinth at the head of the gulf. A long white watercourse, running from near the summit of a mountain to the sea, southeastward of the point, is conspicuous.

Light.—On Drepano Point, at 400 yards southeast of its extremity, is a round masonry tower with dwelling attached, from which a light is exhibited. (See Light List.)

Directions for the Narrows.—The castles of Rumelia and Morea at the entrance of the Gulf of Corinth are easily recognized; steam vessels or sailing vessels entering with a fair wind should keep midway between the two and then steer northeasterly until midway between Rumelia Castle and Morno Point, or at night, until the light of the castle bears 244° astern; then steer 64° for Morno Point Light until within about $1\frac{1}{2}$ miles of it, or until Drepano Point Light bears 169° , when steer about 95° nearly in mid-channel, altering course as convenient.

In fine weather, with a foul wind, a sailing vessel should work along the Patras shore and by the Morea Castle until convenient to stand northward toward Naupaktos, which must depend on the direction of the wind and the strength of the current; the shore on

either side should be approached with prudence, it being bordered by narrow banks, and the rock awash off Drepano Point should be carefully avoided. During fresh northeasterly winds, when a strong current may be expected to set out of the gulf, anchorage will be found in Patras Road.

The coast from the Red Cliff trends in a general easterly direction for about 6 miles to abreast Trisonia Island and is steep-to, the high land extending down from the mountains to the water's edge, except at Maratheas Point, which is low and wooded, 3 miles east of the Red Cliff. Hancock Rock, with $2\frac{1}{4}$ fathoms over it and deep water close around, lies 1,200 yards about 118° from Maratheas Point.

Trisonia Island, situated $8\frac{1}{2}$ miles eastward of Morno Point, is 351 feet high, $1\frac{1}{2}$ miles long northwest and southeast, and $\frac{3}{4}$ mile across. It is separated from the mainland by a deep channel 400 to 600 yards wide; from the northeast part of the island a shoal extends a distance of 300 yards, narrowing the deep water channel to a little over 100 yards in that part. The island appears low, being close under the high land extending down from Mounts Trikorfu and Xeravuni, which are 5,094 and 4,510 feet high, respectively. It is not easily distinguished from the mainland when seen from some distance westward, but may be recognized by the red color of the cliffs on the south and west sides.

Port.—On the eastern side of the island is the village and secure little Port of Trisonia, which is about 400 yards in extent, with depths of 2 to 3 fathoms in the middle; it is 200 yards wide at the entrance. There is a small islet 28 feet high just outside close to the southern shore. On the mainland, abreast the northeast part of Trisonia Island, there are a few houses close to the beach, where good water may be obtained from a well.

H. Ioyannis Island, 146 feet high, lies nearly midway between the southeast end of Trisonia and the mainland; it is little over $\frac{1}{4}$ mile long east and west and about half that distance across. The south side of the island is composed of a cliff, red on the east and white on the west side, the junction being well defined; 100 yards north of the island there is a rocky patch with a small head 1 foot above water.

Prasuthi Island, 111 feet high, 1 mile east of H. Ioyannis Island, is 350 yards long north and south and 150 yards across. A rock, 5 feet high, with deep water close around, lies 400 yards west of this island.

Directions.—Coming from the westward, the position of Port Trisonia is indicated by Mount Xeravuni, whose summit is $3\frac{1}{2}$ miles northeastward of Trisonia Island, and on a near approach the island and the passage separating it from the coast will be seen. In entering the passage keep in mid-channel, but on approaching

the eastern part favor the mainland shore so as to avoid the shoal surrounding the northeastern part of the island; when the southeastern point of the island bears 168° and is well open of the point northward of it steer to the southward for the port.

If approaching the port, passing southward of Trisonia, the island may be coasted along at a prudent distance and the deep and clear passage taken between it and H. Ioyannis Island.

From the southeastward, having passed Cape Psaromyta, steer direct for Trisonia, and when in the vicinity of Prasuthi Island leave it on the starboard hand and enter the passage between it and Trisonia.

Cape Psaromyta, 5 miles southeastward of Trisonia Island, is the termination of the mountainous ridge extending from Mount Xeravuni, which declines in three gradual slopes toward the sea, the ridge for $\frac{3}{4}$ mile from the extremity of the cape is only 400 to 500 feet in height, when it abruptly rises to 2,000 or 3,000 feet. The cape is clear of danger and may be approached at discretion.

Light.—On the extremity of Cape Psaromyta stands a cylindrical tower 29 feet high from which, at an elevation of 211 feet above the sea, is exhibited a flashing white light, visible 21 miles. See Light List.

Eratini and Kiseli Bays.—The coast between Cape Psaromyta and Cape Andromache 9 miles farther east forms two principal bays separated by Cape Vithavri. In the first of these, 3 miles northeast from Cape Psaromyta, at the head of a small bay is the village of Eratini, the port of the larger village of Vetrinitza which stands about $1\frac{1}{2}$ miles from the beach, with a fertile valley extending northwestward between the mountains. The beach is steep and exposed to southeasterly winds, but in fine weather small coasters anchor in a depth of 10 fathoms about 200 yards from the shore. The next small indentation of the coast, close eastward of Eratini, is Kiseli Bay, in which the water is deep, but small vessels anchor off the beach in fine weather. A rocky islet 30 feet high lies close to the shore about a mile southeastward of Kiseli Bay and another, but smaller rock, 6 feet high, 200 yards southeast of Cape Vithavri; with these exceptions the coast is clear and the water deep all the way to Cape Andromache. There is a remarkable bold bluff 820 feet high $1\frac{1}{2}$ miles east of Cape Vithavri. A fixed red light is exhibited at Port Eratini.

Vithavri Bay, situated nearly 1 mile north of Cape Vithavri, is sheltered from all but south and easterly winds; the water is deep, but there is fair anchorage for small vessels in a depth of 13 fathoms 300 yards from the beach.

Gulf of Salona, the ancient Gulf of Krissa, is contained between Capes Andromache and Passalos 9 miles apart; the gulf

recedes upwards of 9 miles to its head, Port Itea. The eastern shore of the gulf, with the exception of Port Sikia, an inlet open to the northwest, is without a break and clear of dangers; the western coast is irregular, with several islets, off-lying rocks, and shoals.

The gulf is surrounded by high mountains culminating northeastward in Mount Parnassus, which rises 8,040 feet above the sea. Parnassus, in classic times the fabled haunt of the Muses, possesses, among other noted spots in its vicinity, the Castalian Spring and the ruins of the Temple of Delphi, on or near the site of which is now the town of Kastri.

Cape Andromache, the west point of the gulf, is a rounded and bold headland, the summit of which, 600 yards from the extremity, is 276 feet high. The cape is steep-to and may be rounded as convenient. At $1\frac{1}{4}$ miles northeastward of Cape Andromache is Cape Trakilos, high and bold.

Port Andromache, situated immediately north of Cape Trakilos, is about 1,000 yards in extent, with an inlet in the southwest part fit for small vessels. The port is deep throughout, there being 24 to 29 fathoms in the middle.

Andromache Shoal lies 800 yards eastward of Cape Trakilos, with $1\frac{1}{2}$ fathoms least water, 5 and 6 fathoms around, and deep water without. Small vessels pass between it and the land, but large vessels should keep outside.

The eastern end of A. Demetrios Island, in line with the western extremity of the spur of Mount Kutsaros, leads 15° eastward of Andromache Shoal.

Port Galaxidi, northward of Port Andromache, is separated from it by a promontory projecting eastward. The port is a large bay, 1 mile in diameter, with depths of 15 to 18 fathoms in the center, and is protected by a chain of islets and shoals extending northeastward from the southern point. In the southern part of the bay are two creeks, one on either side of the town; the southeastern creek, named Portamichi Harbor, is generally full of coasting vessels.

The town of Galaxidi, standing partly on the projection between the two creeks, contains about 4,600 inhabitants, who mostly lead a seafaring life or are employed in shipbuilding, for which the town is famed. There is steamer communication with other ports in the gulf, and telegraphic communication with Patras.

Islets and channels.—Of the islets and shoals protecting Port Galaxidi on the east, there are four of the former, with passages between them into the port. Apsiphia, 28 feet high, the southernmost islet, is 200 yards in length east and west; it lies 400 yards seaward from the southern point of the port. A. Giorgios or San Georges, 84 feet high, the second islet, is larger than the others, 400 yards in diameter, and is 450 yards north of Apsiphia.

The channel between these two islets is the usual passage into the port and carries $5\frac{1}{2}$ fathoms water, but nearly in the middle of the passage 200 yards southwest of A. Giorgios the depth is only $4\frac{1}{2}$ fathoms.

The third islet, A. Panagia, 21 feet high, is 700 yards, about, north-northeast from A. Giorgios; midway between the two is a rocky shoal with less than 1 foot water. A. Demetrios, the fourth islet, is 27 feet high, about 100 yards in diameter and 1,600 yards, about, 93° from A. Panagia, with shallow patches between them.

There is a deep channel 300 yards wide between the reefs east of A. Panagia and A. Demetrios. Itea church dome in line with right extremity of Molimeino Island, 93° , leads through this channel.

Shoals.—A rocky patch with $4\frac{1}{2}$ fathoms least water lies in the middle of the southern part of Port Galaxidi, with Apsiphia Islet Lighthouse bearing 138° E., distant 1,467 yards; and the north extremity of A. Panagia 66° .

A head with a depth of $4\frac{1}{2}$ fathoms on the northern extremity of the foul ground extending nearly 800 yards northward of A. Panagia, lies with the center of A. Demetrios bearing 116° , distant 1,900 yards.

On the extremity of the foul ground stretching northward from A. Demetrios Islet there is a head covered with $4\frac{1}{2}$ fathoms water, situated with the center of A. Demetrios bearing 164° , distant 733 yards. The depth is $4\frac{1}{2}$ fathoms 200 yards southward of this head, with from $5\frac{1}{2}$ to 9 fathoms between.

A rocky patch with 3 fathoms least water, lies with the center of Molimeino Island bearing 77° , distant 380 yards.

Lights.—A small fixed red light is shown from a mast on the island of Apsiphia at an elevation of 50 feet above the sea, visible about 2 miles. A light is exhibited on the wharf at Galaxidi.

Directions.—Cape Andromache should have a fair berth in passing; then, in order to clear the Andromache Shoal, the cape should not be brought southward of 248° until A. Demetrios Islet is open west of the western extremity of the spur of Mount Kutsaros 15° ; with this mark, proceed northward and when past the shoal, if intending to enter by the southern channel, steer for A. Giorgios Islet and pass midway between it and Apsiphia, rounding Petalos Rock, about 200 yards distant on the port hand. Anchor off the town where convenient in a depth of 8 to 10 fathoms, mud, or in Glipha Bay on the west side of Galaxidi in 8 to 13 fathoms, mud and fine sand. This channel is not available for a vessel of deep draft.

If intending to enter by the north channel after passing Andromache Shoal, bring Itea church dome in line with the east extremity of Molimeino, 8° , which will lead between A. Demetrios and A. Panagia, and after passing $\frac{1}{2}$ mile northward of A. Panagia round into the port and proceed to an anchorage.

The entrance northward of the islets is wide, but, as the water shoals northward of them, a large vessel should round A. Demetrios Islet from the eastward at a distance of $\frac{1}{2}$ mile, fixing by cross bearings of the islets, and steer westward midway between it and the northern shore of the port until within the islets, and then steer for the anchorage in Glipha Bay.

Port Itëa (Salona), situated in the northern part of the Gulf of Salona, is about 1,600 yards in diameter and 1,000 yards wide at the entrance between the low sandy Marathia Point on the eastern side, and the western shore 1 mile north of Tripia Point, the northern entrance point of Port Galaxidi.

Town.—Along the beach east of Marathia Point is the town of Itëa, containing from 800 to 900 inhabitants. A shallow bank borders the beach fronting the village.

There are depths of 8 to 10 fathoms over the greater part of the port, and good holding ground. Eastward of the bluff point of Tripia are the three small islets of Stafida, A. Konstantino, and Moli-meino, with shallow rocky ground between and around them, but there is a passage for coasters between these islets and Tripia Point.

Itëa is the port for Salona, distant $7\frac{1}{2}$ miles to the northwest. The town of Salona, ancient Amphissa, has a castle and several well-built churches and manufactories; between it and the scala is a fertile plain covered with olive trees and bounded by high mountains.

Pier.—The pier at Itëa is 150 yards in length, and has a depth of 8 to 10 feet at its end.

Light.—From an iron support on the pierhead a fixed red light is exhibited at an elevation of 20 feet above the sea, visible 5 miles.

Directions.—In proceeding for Port Itëa steer to the northward and pass $\frac{1}{2}$ mile eastward of A. Demetrios Islet; when the islet bears about 197° do not bring it southward of that bearing, and steer 17° until Stafida Islet, the northern of the three off Tripia Point, bears 276° , or a cave on the hillside on the western shore, opens out north of Stafida.

Then steer toward Marathia Point and anchor northward of Stafida Islet, nearly midway between it and the village of Itëa, in a depth of 8 to 10 fathoms, sand and mud, with the center of the village bearing about 6° .

The bank abreast the town extends 400 yards from the shore and is steep-to.

If it be intended to enter Port Itëa, round Marathia Point, avoiding the elbow of the shoal on its southern side, and anchor in 7 to 9 fathoms, about 700 yards northward of the point, sheltered from all winds. It is excessively hot and sultry at this anchorage in the summer. There is a rise of tide at springs of about 2 feet.

Itea is in communication with other ports by means of Greek coasting steamers, which call here regularly.

The coast.—Cape Passalos, the eastern point of the Gulf of Salona, is a bold promontory presenting a broad face seaward at the termination of the mountain range which separates this gulf from Aspra Spitia Bay; the highest point of the range in the immediate neighborhood is the summit of Mount Xero Johannes, 2,799 feet high.

From the southeast extremity of Cape Passalos the shore trends in a northerly direction $2\frac{1}{2}$ miles to Trakilos Point; at 1,200 yards 107° from this point lies the bold rugged island Tsaruchi, 236 feet high and $\frac{1}{2}$ mile long northwest and southwest, with a deep channel clear of dangers between it and the mainland.

From Trakilos Point the shore recedes to the westward, forming a bay $2\frac{1}{4}$ miles across between the point and Mount Kephali. In the northern part of the bay there are three small inlets with deep water. The southwest part of the bay is known as Overesse Bay, near the middle of which and 600 yards from the shore there is a rocky patch with $4\frac{1}{2}$ fathoms least water.

About 1 mile 37° from Trakilos Point lies Trakilos Rock, upon which the depth is 5 fathoms.

The bold promontory of Mount Kephali, 1,136 feet high, is joined to the mainland by a low neck. The eastern face is bold and steep-to.

Aspra Spitia Bay, the entrance to the inner part of which lies between Mount Kephali and Cape Munda, recedes here 2 miles to the northward, with deep water throughout. The western part of this bay is known as Anti Kyrra Bay and affords a well-sheltered and good anchorage in depths of 13 to 16 fathoms, about 500 yards from the surrounding shores.

The port and village of Aspra Spitia, ancient Anti Kyrra, on the north shore of the bay, is the scala or landing place for the town of Livadia in the interior. It carries on a considerable trade.

Local steam vessels call here two or three times a week, and there is telegraphic communication with Patras and Corinth from Distomi, a village under the slopes of Mount Parnassus 4 miles to the northward.

The coast from Cape Munda trends in a southerly direction $2\frac{1}{2}$ miles, thence easterly $5\frac{1}{2}$ miles to the head of Zalitza Bay. Mount Tarsos, 2,354 feet high, rises abruptly from the sea $1\frac{1}{2}$ miles east of Cape Munda. From this mount a ridge extends parallel to the shore, rising gradually to Kiveri Peak, 5,136 feet high, the western summit of Mount Helicon, 1.7 miles north of Zalitza Bay.

At 2 miles southward of Cape Munda and 250 yards from the shore lies a small, steep islet named Kassidis, 76 feet high; 1 mile

farther south there are two islets, little over $\frac{1}{2}$ mile apart east and west.

Ambelos, the eastern of the two, lies about $\frac{3}{4}$ mile from the coast. It is about $\frac{1}{4}$ mile long north and south, steep and cliffy, and rises to a peak at its southern end 202 feet high. Daskalio, the western islet, is 86 feet high, 200 yards in diameter, with precipitous cliffy sides except on the north. Both these islets are surrounded by deep water and are steep-to.

From the head of Zalitza Bay the shore trends southwest $2\frac{1}{2}$ miles to Cape Velanidia, the summit of which is 316 feet high.

Zalitza Bay is $2\frac{1}{2}$ miles deep in an easterly direction and nearly the same distance across at the entrance. About $\frac{1}{4}$ mile from the northern shore of the entrance is a rocky shoal with 6 feet water, the only danger.

Port Sarandi.—Tamburlo Point is $7\frac{1}{2}$ miles southeastward of Cape Velanidia. The coast on the western side of the point trends almost due north for $3\frac{1}{2}$ miles and, meeting the highland trending eastward from Cape Velanidia, forms a bight named Port Sarandi, open to the southward, at its head. The port is more than 1 mile deep, with a sandy beach at its head, and is about 1,200 yards wide. The depth in the middle of the inlet is great, and at $\frac{1}{4}$ mile from the head is from 17 to 20 fathoms.

Tamburlo Point projects to the southward, and off it are two small islets, the smaller about 400 yards southward of the point and Vromo, the larger, 1 mile westward of the point.

Mount Helicon—Aspect.—This celebrated mountain extends eastward and westward along this part of the coast from near the entrance to Aspra Spitia Bay, where Mount Verseniko, its western shoulder, rises from the sea to the height of 2,330 feet. At $4\frac{1}{2}$ miles farther eastward is Kiveri Peak, only $1\frac{1}{2}$ miles inland from the head of Zalitza Bay, and 3 miles farther eastward Palaevuna Peak, 5,740 feet high at its highest point, is $3\frac{1}{2}$ miles northward of the head of Port Sarandi.

Dobrena Bay.—This magnificent bay is $5\frac{1}{2}$ miles in length east and west and from about 1 to $1\frac{1}{2}$ miles in width. In the middle, near north shore, is Kuveli Islet, about 600 yards in length north and south. The shores of the bay are rocky and irregular, the water is generally deep, and there are no hidden dangers.

Within the bay are three inner bays or ports, viz, Port Vathy, at the western end; Port Lusa, on the northern side; and Port Aliki at the eastern end. The entrance is from the south and is fronted by Phonia, Grombolura, and Makro, three islands, which make an almost landlocked basin of the interior; the largest island, Makro, is the most eastern.

The western passage into the bay is the best; it is about 2 miles eastward of Tamburlo Point; and all the islands should be left on the starboard hand on entering.

Mount Korombili, of conical form and 2,670 feet high, rises over the eastern part of the bay and serves as a good guide.

Livadostro Bay.—This bay, at the head or eastern end of the Gulf of Corinth, is about 7 miles wide at the entrance between Tamburlo Point on the north and Cape Olmiæ on the south; from thence it extends eastward 13 miles. The Kala Islands lie nearly in the middle of the entrance, 3 miles southward of the entrance to Dobrena Bay, but are steep-to and not of much importance except for the space they occupy. Eastward of Dobrena Bay is Port Livadostro, an inlet 2 miles wide at the entrance; on its western side the coast rises almost perpendicularly from the sea to the high land of Mount Korombili. Mount Elatia, ancient Kithaeron, 4,680 feet high, rises northeastward of the Port of Ghermanó, ancient Ægosthena, the next bay eastward, which is open to the west; the low shore at its head is the eastern extremity of the Gulf of Corinth.

The southern shore of Livadostro Bay is the base of a chain of mountains, of which the greatest height is Mount Gereneia, 4,494 feet high. The peak of Melangavi, about $6\frac{1}{2}$ miles westward of Mount Geraneia, is remarkable, rising 3,445 feet above the sea from the lowland of the Isthmus of Corinth, and is a good guide for the Bay of Corinth.

The Kala Islands are the four islets Kala, Daskalio, Praso, and Prasophillo; they occupy a space $1\frac{1}{2}$ miles in extent northwest and southeast by a width of 1 mile, and lie nearly in the middle of the entrance of Livadostro Bay.

Kala, the largest and eastern islet, 244 feet high, rises in two hills and is separated by a shallow sandy neck from Daskalio, the northwestern islet, which has one hill. Praso and Prasophillo, the other two islets, lower and smaller, are also separated by shallow water and lie 400 to 600 yards southwestward of and nearly parallel with the two larger islets. A 2-fathom spit extending 400 yards southeastward from Praso, the larger of the two southwestern islets, leaves between it and the coast bank of Kala a deep passage about 200 yards wide to a limited anchorage within in a depth of 18 fathoms; the entrance from the northwest is wider. The ruined convent of San Nikolo is on the western side of Kala. These islets being surrounded by the highland of the gulf, appear lower than they really are.

Corinth Bay is the deep bight southward of the promontory of Melangavi, which terminates in the cape of that name, and which promontory separates the Corinth Bay from that of Livadostro.

The Corinth Bay is $4\frac{1}{2}$ miles wide between Cape Melangavi and the southern shore and extends nearly 7 miles southeastward to the shore of the Isthmus of Corinth at its head, where the Corinth Canal connects the Gulf of Corinth with the Gulf of Athens. The southern shore is low and partly cultivated, but at a short distance inland it rises to the highland of the Morea. There are no dangers, and the water is everywhere deep at a prudent distance from the shore.

Light.—On Cape Melangavi stands a square masonry lighttower and dwelling, 40 feet high, from which, at an elevation of 192 feet above the sea, a light is exhibited. (See Light List.)

The Isthmus of Corinth is from about 53 to 270 feet above the sea, and the distance across by the canal is $3\frac{1}{2}$ miles. On the northeast is the high land of Mount Geraneia, and opposite, on the southern side, the mountains of the Morea.

Ancient Corinth.—At $1\frac{1}{2}$ miles from the shore on the southern side of Corinth Bay and $4\frac{1}{2}$ miles westward of the canal, are the ruins of the ancient city of Corinth; traces of its walls are still to be seen, and a few Doric columns, the relics of a temple, are the principal and most interesting monuments of antiquity still existing.

Corinth, on the southeastern shore of Corinth Bay and about $1\frac{1}{2}$ miles westward of the entrance to Corinth Canal, has rapidly increased in size since the opening of the canal, and has regular steam communication with the Adriatic, Ionian Islands, etc., and by a good road across the isthmus. It is on the railroad from Athens to Patras and Pyrgos and also to Nauplia, and is in communication with the general telegraphic system of the Continent.

Mole—Light—Anchorage.—A mole about 100 yards in length extends from the rocks off Lewis Point, northern extremity of the town; it serves as a screen to the landing pier within it.

About $\frac{1}{2}$ mile eastward of the mole, in fine weather, there is anchorage in a depth of 15 to 18 fathoms, but small craft may anchor nearer the town.

A better anchorage with northwesterly winds is at Lutraki, in the northeastern part of the bay, at the foot of the Peak of Melangavi, but a vessel anchoring here will be rather close inshore, the water being deep.

The telegraph cable from Patras is landed about 600 yards northeastward of the canal entrance, and another cable is laid from the southern coast of the isthmus to Athens.

Corinth Canal follows almost exactly the line of the canal commenced, but never completed, by the Emperor Nero, 1,800 years ago. The canal was commenced in 1882 and opened by the King of Greece on the 6th of August, 1893.

Dimensions—Depths.—The canal is straight in a northwest and southeast direction, and is 3 statute miles 1,610 yards in length.

The northwestern portion of the canal for a distance of 1,280 yards and the southeastern part for a distance of 933 yards were dredged, and are 98 feet wide at the water line, 72 feet at the bottom, with a depth of $25\frac{1}{2}$ feet. The remainder is a cutting through the land (the summit of which was 250 feet above the level of the sea) and is faced with masonry; it is nearly 81 feet wide at the water line, 69 feet at the bottom, and has a depth of about $26\frac{1}{4}$ feet.

The railroad from Athens to Corinth and Patras crosses the canal by a bridge, the height of which from the water to the lower surface of the principal beams is 144 feet.

The canal is available for vessels whose draft does not exceed $23\frac{1}{2}$ feet and whose breadth is not more than $65\frac{1}{2}$ feet.

Pilots are recommended for large ships; also a tug astern as well as ahead. The tugs are of small power; they are supplied free of charge to vessels of and above 800 tons.

Moles.—The entrance to the canal on the Corinth side is protected by two moles, forming the Port of Poseidonia, the heads approaching one another and leaving a passage 80 yards wide.

The southeastern entrance, in Kalamaki Bay, is protected by a single breakwater curving from the shore northeast of it.

Bollards are placed along the sides of the canal, about 110 yards apart, to assist vessels keeping in the middle of the canal.

The towns, Poseidonia, at the northwestern end, and Isthmia, at the southeastern end, were founded in connection with the canal.

Lights.—The northeast molehead at Poseidonia, Corinth entrance, is marked by a fixed red light and the southwest molehead by a fixed green light.

The molehead at Isthmia, southeast end of the canal, is marked by a fixed green light; on the opposite or west point of the entrance to the canal a fixed red light is shown, visible 3 miles.

In addition to these are electric lights arranged in pairs, one on either side of the canal, about 218 yards apart.

Telegraph.—The telegraph follows the side of the canal.

Tide.—It is high water, full and change, approximately, at 5h. In the absence of wind springs rise 10 inches; neaps are irregular.

Current.—The movement of the water in the canal is dependent entirely on the wind and its effect in holding up the water either in Corinth or Kalamaki Bay. The general velocity of the stream is $1\frac{1}{2}$ knots, and seldom exceeds 2 knots. There is a range of 5 feet in the level of the sea at Poseidonia, and of 3 feet at Isthmia. Sometimes a set across the entrance at Poseidonia is experienced.

Signals indicating the current are exhibited from the signal mast at each end of the canal, thus:

By day two triangular white flags and at night two lights, placed vertically, the upper red and the lower white, indicate that the current is entering the canal from that end.

By day a white triangular flag and at night two red lights, placed vertically, indicate that the current is going out of the canal from that end.

No signal at the signal mast indicates no current.

Directions.—The best time to navigate the canal, especially with large vessels, is when the stream is adverse, as they will be more under command. Vessels can not pass one another in the canal, there being no sidings.

In entering the canal from the gulf of Corinth, vessels should be prepared for an occasional slight current setting to the northeast.

Provisional regulations for navigating the canal are liable to alterations and a copy of them should always be obtained from the local authorities.

Southern shore—General remarks.—From the head of the bay of Corinth, the coast of the Morea westward as far as Vostitza, about 45 miles, has only open roadsteads where, during fine weather, coasting vessels collect the produce of the country at the different scalas or landing places. The whole of this district is well populated, nearly all the inhabitants are employed in the cultivation of currants, for which it is famous. The coast is everywhere clear of danger and may be approached at discretion. Among the different grand and arid mountains of the Morea, Mount Zyria, ancient Cyllene, rises 7,800 feet above the sea, about 12 miles inland. Several mountain torrents discharge themselves into the gulf but do not merit any particular mention.

The Athens and Patras railroad follows the coast-line, generally at a short distance inland.

Landmark—Avgo Peak.—A special object of recognition on this coast is the white conical peak of Avgo, which rises to a height of 562 feet close to the shore about 24 miles westward of the entrance to the Corinth Canal; it is seen from all parts of the gulf and is an excellent mark.

Akrata Point, about 8 miles westward of Avgo Peak, is low and formed of the alluvium from the river Krathis; the shore between consists of a narrow strip of flat cultivated land at the foot of the mountains, with a shingly beach which is steep-to throughout. About 1 mile west of Akrata Point the shore is steep and cliffy, with the exception of the low alluvial points of Engali Bay about 6 miles farther west.

Vostitza Bay is semicircular, open to the northward, 2 miles wide between points Gyphlissa and Mirlia at the entrance, and re-

cedes nearly 1 mile from that line. The water is very deep until within $\frac{1}{2}$ mile of the head of the bay, when it shoals from 25 to 10 fathoms close in.

The town of Vostitza, which by law is restored to its ancient name Ægion, stands on a steep flat hill in the southern part of the bay, about 50 feet above the sea, and contains about 8,000 inhabitants. It is a place of considerable importance, with a thriving trade.

Mole.—A mole extends sufficiently far from the shore, about the middle of the bay, to admit of steamers for cargo anchoring westward of it and mooring with stern hawsters to it. There is a stone quay along the shore below the cliff.

Supplies.—Small supplies may be had and good water is obtained from a fountain on the quay. Currants are shipped here in great quantities during the season.

Communication.—Vostitza is in regular communication by rail with Patras and Pyros westward, and with Corinth, Athens, and Nauplia eastward, and by steamers and telegraph with these and other ports.

Light.—From a metal column and shed on the molehead, at an elevation of 27 feet above the sea, a fixed red light is exhibited, visible 5 miles.

Directions—Anchorage.—Vessels from the westward bound for Vostitza should keep in the middle of the gulf until near Trisonia Island, and then steer southeastward for the town, which, when first seen, appears as two, the lower part being separated by the brow of the hill from the higher. The points of the bay should not be rounded too closely, as the shore all around is flat, low, and sandy.

Merchant vessels anchor off the western angle of the town, 400 yards from the shore, in a depth of about 15 fathoms, mud, and good holding ground; or moor with their sterns to the mole on its western side. Vessels of war anchor a little farther out. The anchorage is sheltered from the prevailing winds which blow strongly up or down the gulf, especially those from the eastward during the winter months.

Approaching from the eastward, Cape Psaromyta, on the northern shore of the gulf and nearly 5 miles northeastward of Vostitza, indicates its position.

Coast.—About 4 miles northwestward of Vostitza Bay is Cape Salmeniko, low and projecting, with the rivulet of the same name running into the sea on its western side; westward of the point is Cape Lambiri, at the foot of Mount Lubista, 2,440 feet high at only $1\frac{1}{2}$ miles from the shore; then follows, about 5 miles farther westward, Drepano Point, previously described.

This part of the coast offers nothing worthy of remark.

WESTERN COAST OF THE MOREA.

General remarks—Aspect.—The description of the Gulfs of Patras and Corinth has been given in the preceding pages, the description of the western coast of the Morea from Cape Papas follows. The land immediately southward of that cape rises in rounded dark hills; Mavre Vuno, the highest, 808 feet above the sea and 3 miles from the cape, falls suddenly towards the plain on the south, from whence a low sandy beach fronting the densely wooded low land, extends southward $3\frac{1}{2}$ miles to Kunupelli Point, a rocky isolated height, 200 feet above the sea, and about $\frac{1}{2}$ mile in extent, with the ruins of a tower on its northeastern part.

From Kunupelli Point, the low sandy shore, wooded and cultivated within, continues southwestward to Cape Glarenza, a distance of $13\frac{1}{2}$ miles. Kotiki Lake, close to the sea and nearly midway between the point and cape, is about $2\frac{1}{4}$ miles in length, with brackish water, and contains abundance of fish; it communicates with the sea by a narrow outlet. At 2 miles southwestward of Kotiki Lake is the smaller lake Aliki, and southeastward of the latter is the populous village of Lekhena, containing upward of 600 houses.

Patches.—Northwestward of Kotiki Lake, and nearly 2 miles from the shore, there is a 7-fathom rocky patch; and off the southern end of the lake, $1\frac{1}{4}$ miles from the shore, is a 5-fathom patch.

Cape Glarenza (ancient Kyllini) is a rocky projection with a large rock above water off its northern extremity, and with rocky ground extending more than 300 yards outside the rock, along the northwestern face of the cape, and around Kaufkalida Islet, which latter is about 1 mile westward of the rock off Cape Glarenza. In rounding the cape from the westward for the anchorage off the village of Glarenza it should be given a wide berth.

Mole—Anchorage.—On the inner side of Cape Glarenza the shore is a bay open to the northward, and at the western part of it is the village of Glarenza, with a customhouse.

The mole was about 750 yards in length, curving from northeast to southeast, but has been partly destroyed, and its submerged portion constitutes a danger to navigation, and vessels should pass 600 yards to the eastward of the light. About $\frac{1}{2}$ mile off the village is excellent summer anchorage in depths of 5 or 6 fathoms, sand and mud; coasters anchor closer in. Greek steamers call here regularly.

Northwestward of the village and near the extremity of Cape Glarenza are the ruins of ancient Cyllene, consisting of a tower, tombs, fragments of walls, the remains of an ancient mole and port.

Light.—A light is exhibited from an iron column about 600 yards southeastward of Cape Glarenza. (See Light List.)

Kaufkalida Islet, 18 feet high and rather more than 200 yards in diameter, lies about 600 yards off the extreme point just westward of Cape Glarenza, and is almost connected with the mainland by a reef of rocks awash; a little eastward of the islet is a large rock above water. The edge of the shore bank in 5 fathoms is about $\frac{1}{4}$ mile outside the islet.

Light.—On Kaufkalida Islet, from a square masonry tower with dwelling attached, 50 feet high, an occulting light with red sector is exhibited. (See Light List.)

Kastro Tornese.—From the western point of Cape Glarenza the coast trends southward for 6 miles to Cape Trepito; it is clifty, with sandy beach and bordered by a bank extending nearly $\frac{1}{2}$ mile offshore. It is backed by high land, and about midway is a remarkable hill on which is the castle of Tornese, ancient Chelonites, 857 feet above the sea, and a most conspicuous object. At the foot of the castle is the little village of Klemutzi, and inland are the cultivated and wooded plains of Elis.

The Montague Rocks (lat. $37^{\circ} 55' N.$, long. $21^{\circ} 00' E.$) lie 6 miles westward of Kaufkalida Lighthouse. These rocks are covered by the red sector of Kaufkalida Light.

Sailing vessels bound to Patras from Zante usually stand across toward Kastro Tornese until within 3 miles of the shore, and then steer to the northward. With southerly winds the current is strong in the vicinity of the rocks, and also between them and the Tornese shore.

Cape Trepito (lat. $37^{\circ} 51' N.$, long. $21^{\circ} 07' E.$) is clifty on its western side, but the shore is sandy between it and Glossa Point, which is again formed by cliffs 1 mile eastward of Cape Trepito. At $1\frac{1}{4}$ miles northward of the cape a small stream runs into the sea, near which at a short distance inland are petroleum springs.

Telegraph cable.—A telegraph cable from Zante is landed at Cape Trepito.

The coast from Cape Trepito trends in a southeasterly and southerly direction $15\frac{1}{2}$ miles to Cape Katakolo, with a low sandy shore; the cultivated interior is the continuation of the Plains of Elis. During fine summer weather vessels may anchor anywhere in this bay in depths of from 9 to 12 fathoms, sand.

The Gastuni River runs into the sea about 6 miles southeastward of Cape Trepito, and is sufficiently deep for large boats to ascend several miles.

Rocks.—At Paluki Point, 4 miles southeastward of the mouth of the Gastuni, rocks extend $\frac{1}{2}$ mile offshore and are here and there scattered along the coast to the southward until within 1 mile of Cape Katakolo, therefore this part of the shore should not be approached nearer than 1 mile.

The monastery of Skaphidia, standing on the foundation of an ancient Venetian fortress 370 feet above the sea and 4 miles northward of Cape Katagolo, is inhabited by monks, and is a conspicuous object. Pondiko Kastro, the ruins of an ancient fortress 284 feet high and 2 miles northward of Cape Katakolo, is also conspicuous and a guide to Katakolo Bay. A few miles inland are Mounts Muria and Kremasti, 931 and 1,165 feet high, respectively.

Cape Katakolo is the low extremity of a tongue of land projecting nearly 2 miles southward. The coast westward and northward of the cape is irregular and bordered by rocky shoals, and by the two little islets Koraka and Tigani. The eastern or inshore side of the cape is also bordered by rocky shoals, and a sandy spit with only 2 fathoms water extends 600 yards from the cape; therefore, in rounding the cape, it should have a berth of $\frac{1}{2}$ mile or more.

Light.—On the slope of the ridge, 779 yards within the extremity of Cape Katakolo, is an octagonal lighthouse of gray stone, 30 feet high, from which is exhibited, at an elevation of 149 feet above the sea a group of occulting light, visible 17 miles. (See Light List.)

A telegraph cable from Zante is landed on the western coast of the peninsula of Katakolo, about 1,600 or 1,800 yards northward of the cape.

Katakolo Bay.—Between the peninsula of Cape Katakolo and the coast eastward of it is a semicircular bay with a sandy beach at its head; it is quite sheltered from the westward but is exposed to southerly winds which send in a heavy sea.

Mole.—About 1,600 yards northeastward of the cape a mole projects about 600 yards eastward, and then 500 yards northeastward; it is 39 feet wide at the sea level and 20 feet above water; the depth at the head and along the inner side of the outer arm is 33 feet. The mole affords excellent shelter from southerly winds in 4 to $5\frac{1}{2}$ fathoms; the bottom inshore toward the customhouse is rocky and the water shallow.

There is anchorage all over the bay, and the water shoals gradually toward the beach at its head, but rather suddenly toward the village.

Light.—A light, elevated 30 feet above the sea, is exhibited from the molehead at Katakolo. (See Light List.)

Village.—Northward of the mole, in a small bend in the shore, is the village of Katakolo and the customhouse.

Communication.—Katakolo is a telegraph station and is in direct railroad communication with Patras and Athens, via Prygos; it is also in steam communication with other ports. Water is scarce, there being but one well at the head of the bay near the commencement of the long sandy beach.

Pyrgos.—The town of Pyrgos, situated on a hill 7 miles eastward Cape Katakolo, contains 5,000 inhabitants, is a telegraph station, and

can be reached from Katakolo by a good carriage road as well as by railway. The surrounding plains are richly cultivated, but, near the sea, the malaria arising from the lakes causes ague and fever to be prevalent in the summer months.

Gulf of Arcadia (ancient Kyparissia).—This so-called gulf is in reality only the bay included between Cape Katakolo and Cape Kunello, distant 31 miles south-southeastward from it; and, from this line it recedes about 10 miles. The shore nearly the whole length of the gulf is low, sandy, and backed by high mountainous land. A little within the beach in the northeastern part of Katakolo Bay is Lake Muria, $2\frac{1}{2}$ miles in length.

Southeastward of Lake Muria, and nearly 7 miles east-southeast from Cape Katakolo, is the mouth of the Ruphea River, ancient Alpheus, one of the largest streams in the Morea, which boats, drawing from 3 to 4 feet water, ascend between 3 and 4 miles. Vessels anchor off the river in the summer months and load with timber for shipbuilding, which is floated down the stream.

The coast from the mouth of the Ruphea, until within $3\frac{1}{2}$ miles of the town of Kyparissia, is a clean sandy beach with several streams running into the sea. At $1\frac{1}{2}$ miles from the Ruphea, the chain of lakes extending along just inside the coast-line recommences with Lakes Agulinitza or Ruphea, and Kaiffa; the former is 7 miles in length, the latter $2\frac{1}{4}$ miles, and the whole extent of the lakes is nearly 16 miles. These lakes abound in fish, and are separated from the sea by a narrow slip of sand covered with trees, principally pines. About 1 mile inland from Lake Kaiffa is the mountain of that name, 2,445 feet high and easily distinguished.

Water.—During fine summer weather vessels may anchor off the mouth of the Ruphea about $1\frac{1}{2}$ miles from the shore; water may be obtained here by leading long hoses into boats. With sea winds a swell sets in. The southern side of the entrance to the river where the beach is steep, is the best position.

Kyparissia.—The town of Kyparissia, commonly known as Arcadia, is erected on the site of the ancient city about $\frac{1}{2}$ mile from the beach, on an elevated spur of Mount Psykro, which, about 3 miles inland, rises 4,156 feet above the sea. The town is at the foot of the ancient Acropolis, contains about 5,000 inhabitants, and is conspicuous from seaward.

During the summer months, coasting vessels anchor off the town in a depth of about 15 fathoms and load with grain; but the roadstead is exposed to the prevailing northwesterly winds which send in a heavy sea. A small inlet open to the northward, with a mole projecting from its western point, affords shelter for small craft.

The coast from Kamariki, about $3\frac{1}{2}$ miles northward of Kyparissia, becomes rocky, with a few sandy bays at the outlets of mountain

streams, and curves round in a southwesterly direction about 11 miles to Cape Kunello, the southern limit of the Gulf of Arcadia; from the southward, the land at this part appears to slope gradually down to a low point.

Mount Morena, a little southward of and $2\frac{1}{2}$ miles within the cape, is an isolated conical hill 1,250 feet high and easily recognized.

Between Cape Kunello and Marathon Point, about $6\frac{1}{2}$ miles farther southward, the coast is rocky but clear of danger, with two or three streams running into the sea. A well cultivated plain, with extensive olive plantations and several villages, extends inland to the foot of the high rugged range of Mount Agia, which rises 3,957 feet above the sea and trends parallel with the coast.

During summer small country vessels anchor off the bights in the coast to collect the produce.

Proti Island (ancient Prote) is 2 miles in length north and south, the northern part is 1 mile in breadth and 605 feet high, with a cliffy ridge around its upper part, except on the northwestern side, the southern part averages about $1\frac{1}{4}$ miles across for a distance of 1 mile. From the southward the island appears round, but, from the westward, the north end is high and round and the south end low. The island is wooded, covered with brushwood, rocky, steep-to, and separated from Marathon Point by a channel 1,200 yards wide.

Proti Channel.—The village of Marathopolis, erected since 1860, stands on the low rocky point of Marathon; from the point a sandy spit extends 400 yards in a westerly direction with $4\frac{1}{2}$ fathoms water on its edge, leaving a passage about the same breadth between it and a 5-fathom rocky shoal, $\frac{1}{4}$ mile off the northeastern part of the island, known as Porti Channel; elsewhere in the channel the depth is from 6 to 10 fathoms.

During summer coasting vessels usually anchor southwestward of the village in 7 fathoms water to load with currants, the principal produce of the district. During southwesterly gales a heavy sea runs through the channel.

Coast—Sikia Channel.—At 7 miles southward of Proti Island is the Sikia Channel, the northern passage into Navarin Bay and the narrow cutting separating the northern end of Sphaghia Island from the mainland; the coast between Proti Island and this channel is low, rocky with sandy bays, and bordered by shallow water, with cultivated plains inland.

The Sikia Channel, in ancient times a useful passage, was choked with sunken vessels and stones in 1571, to protect the Turkish galleys which had escaped from the battle of Lepanto, and has only 2 feet water at its inner end.

Paleo Avarino.—On a conical hill $\frac{1}{2}$ mile northward of the channel is Paleo Avarino (ancient Pylos), the remains of a large castle 450

feet above the sea, having on its northern and eastern sides perpendicular cliffs; it was once the residence of Nestor, and in the face of the cliff on the northern side is a large cave which bears his name.

Port Voithio Kilia.—Beneath the castle on the north is Port Voithio Kilia, a small circular inlet used only by fishing boats; it is silting up with sand. The port is separated from the extensive marsh Dagh Liani, on the east, by a narrow neck of sand.

Sphaghia Island—Kumatodes Reef.—Sphaghia Island (ancient Sphacteria) is nearly $2\frac{1}{2}$ miles long north and south and from 600 to 1,000 yards in width. Mount Elias, at its northern end, is 514 feet in height, and there are several smaller peaks on the southern part, the highest being 327 feet. The eastern coast is high and steep to throughout; the western coast is also high, and toward the southern end is composed of steep whitish cliffs; its central part is irregular, with rocky projections, and is everywhere bordered by rocks.

At 1,800 yards southward of Tapho Point, the northwestern extremity of the island, and about 300 yards from the shore, is the Kumatodes reef with 3 fathoms water.

Pylos Islet.—About $\frac{1}{4}$ mile from the southern end of Sphaghia is the rocky islet of Pylos, 114 feet high, with two smaller islets on its northern side; between the latter and the broken rocks close inshore at the southern end of Sphaghia is a narrow but deep channel into Navarin Bay, which, with a commanding breeze or under steam, may be used by moderate sized vessels with due caution, but the main channel is recommended. One of the Pylos Islets is perforated, the hole appearing like a triumphal arch.

Light.—On the southeastern side of Pylos Islet, at the northern side of entrance to Navarin Bay, is a stone lighthouse from which a group occulting light is exhibited, at an elevation of 116 feet above the sea, visible 14 miles. See Light List.

Navarin Bay.—This extensive bay is covered by Sphaghia Island, and is thus completely sheltered from westerly winds and sea; it is the most capacious harbor in the Morea.

The entrance lies between Pylos Islet and the mainland, and is about $\frac{1}{4}$ mile wide, with depths of 30 to 35 fathoms in the fairway. A patch of $4\frac{1}{2}$ fathoms lies $\frac{1}{4}$ mile off the southern shore, $\frac{1}{4}$ mile 135° of Pylos Lighthouse, reducing the width of the entrance available for vessels of deep draft to that distance. After a continuation of northerly winds, a current sets out of the harbor, which, with baffling winds, at times renders it difficult of access to sailing vessels.

Within, the bay opens out to 2 miles in breadth, general depth varying from 15 to 25 fathoms, but in the northern part is the Sphaghia Shoal of 3 fathoms, and Kuloneski Islet. The eastern shore of the bay for some distance within the entrance is rocky, bordered by shallow water, and should not be approached too closely

nor within a depth of 10 fathoms, as it then shoals suddenly; near the town are patches of $2\frac{1}{2}$ and 3 fathoms at 400 and 500 yards from the shore.

The eastern shore of Sphaghia Island is rocky; the head of the bay is sandy, with extensive lagoons and marshes just in-shore of the beach; the land on the eastern side is well cultivated and rises in undulating ridges, with the Jalova and Xerias Rivers and other streams running through the valleys to the sea. The water all round the eastern shore is comparatively shallow, the 5-fathom curve being 600 yards from the beach.

Pylos Shoals, two rocky banks, with 6 fathoms least water and 800 yards apart in a northeast and southwest direction, lie in the southern approach to Navarin Bay, at about $1\frac{1}{2}$ miles 200° from Pylos Islet; between and around both banks the water is deep. The western side of Kuloneski Islet, in Navarin Bay, in line with the eastern side of Pylos Islet, leads in the direction of the shoals. In strong winds the sea breaks heavily over these banks, and all vessels should avoid them, especially those of deep draft.

San Nikolo Rocks, one above water, extend about 100 yards off the shore abreast these shoals.

Foul ground, 8 to 10 fathoms, rock, lies nearly in mid-channel just within the entrance to the bay.

Kuloneski Islet, or Marathonisi, in the middle of the upper part of the bay, is about 200 yards in length, 25 feet high, rocky, and surrounded by a bank which within the 10-fathom curve extends 400 yards southward and 500 yards westward of it. In the bay eastward of the islet the ground is foul.

Sphaghia Shoal.—This rocky shoal, about 400 yards in diameter, with 3 fathoms least water, lies in the northwestern part of the bay, its shoalest part being 800 yards from Sphaghia Island and 284° distant 1,600 yards from the center of Kuloneski.

Aspect.—The position of Navarin Bay is indicated from a long distance seaward by the mountains in its neighborhood. About 12 miles northward of the entrance Mount Agia rises 3,957 feet above the sea, the summits northward and southward of it being of much less height; farther southward is a dip or cut in the mountain; at 8 miles eastward of Navarin is the remarkable conical peak of Mount Lykodemos, 3,132 feet high, with all the heights to the southward much lower. The higher mountains may be seen at a long distance from the westward, and, on a near approach to the land, Mount San Nikolo, a remarkable sharp peak 1,542 feet high, rising from the coast immediately southward of the entrance to Navarin Bay, with a white church below the summit on its southern side.

Paleo Avarino, the ruined fortress on the northern side of Sikia Channel; Navarin Fort or Neo-Kastro, on the eastern side of the

entrance to the bay; the steep whitish cliffs of the southern part of Sphaghia Island; and Pylos Islet, with its lighthouse, are all good guides for the entrance to Navarin Bay.

Directions.—There are no dangers in entering Navarin Bay in vessels of moderate draft. The fairway is about 500 yards southward of Pylos Island light; the Greek national flag on the flagstaff at Fort Neo-Kastro makes a good mark to steer for from seaward.

Vessels of deep draft coming from the southward should avoid Pylos Shoals, of 6 fathoms, and the $4\frac{1}{2}$ -fathom patch with a rock southeast of Pylos Island.

Anchorage.—During the summer months vessels usually anchor in about 19 fathoms at about $\frac{1}{2}$ mile northward of the town, with Navarin Point 202° , distant $\frac{3}{4}$ mile, or nearer the point on that bearing if desirable. Small vessels anchor closer in, off the mole.

In winter vessels anchor northward of Kuloneski Islet in from 10 to 13 fathoms, off a large white building close to the beach near the watering place. There is less swell here than off the town and the squalls in southwesterly and northwesterly gales, particularly the latter, are less heavy; it is also more convenient for getting to sea and the water not so deep as off the town.

Navarin, or Neo-Kastro.—This town, containing about 2,300 inhabitants, is prettily situated in a valley on the southern side of the bay; the houses are clean, and there is a post office, customhouse, quarantine office, and telegraph. The nearest railroad station is Pargos, about 50 miles to the northward, which railroad has a short line to Katakolo on the coast.

There is a small mole extending out from the west point of Neo-Kastro.

Fort Neo-Kastro, on the eastern side of the entrance and 181 feet above the sea, was formerly strong but is now dismantled and used as a prison.

Light.—From an iron lamp-post on the molehead at Neo-Kastro, at an elevation of about 25 feet above the sea, a small fixed red light is exhibited.

Water.—The town and fortress are supplied with water from an aqueduct which winds round the eastern hills up the first valley to the north, but shipping can obtain only small quantities from a fountain in the square. Excellent water, however, can be procured from the river Jalova as well as from springs, when at the anchorage in the northern part of the bay.

Coast.—The coast from San Nikolo Rocks trends southward for 5 miles to Methoni, is everywhere rocky and steep-to, and a westerly swell is generally breaking on it. At 1 mile northward of Methoni are Kaliora Islets or Rocks, 5 feet high; Nisakulia, 60 feet high; and

another smaller islet northward of the latter. The hills southward of Mount San Nikolo gradually decline in height toward Methoni.

Methoni, or Modon (ancient Methone), once a town of much importance, is now only a village, with about 1,000 inhabitants and no trade. On a point of land projecting about $\frac{1}{4}$ mile to the southward is an ancient Venetian fortress, now in ruins; it is united on the south to Sukule, a rocky islet 53 feet above the sea on which is a round tower. The shore on the western side of the fortress and around the islet is rocky. The ancient port, formerly formed by a mole running parallel with the fortress wall, is now filled with stones and sand, the old mole being level with the water; a marble pillar stands on a rock at the end of it a short distance eastward of the fortress wall.

Mole.—The marble pillar is connected to Kastelli Methoni by a mole, and a mole extends 100 yards eastward from the pillar, forming shelter to the northward for small vessels.

Light.—A fixed red light, elevated 29 feet above the sea, is exhibited from the eastern end of the mole, visible 5 miles.

Methoni Channel separates Sapienza Island from the Morea and is 1,600 yards wide from its northern extremity to Methoni Mole, but a ridge of uneven ground, steep-to, extends southward from Sukule Point to within 300 yards of Karsee Point, Sapienza.

The depths on this ridge vary from 10 to $2\frac{1}{2}$ fathoms, the latter depth being 400 yards from Sukule Point; and at 650 yards from Sapienza there is a head with $4\frac{1}{2}$ fathoms. Between the tail of the ridge and Sapienza, at less than 200 yards from Karsee Point, the narrow channel has a depth of 11 fathoms.

From Methoni, a sandy shore curves round southeastward, forming a semicircular bay terminating in steep white cliffs, and bordered throughout by shallow water extending some distance offshore. At $\frac{1}{2}$ mile southeastward of the mole and 300 yards from the shore, with which it is connected by rocks many of which are awash, is Kuluras Islet, 43 feet high, about 120 yards in diameter, and with sunken rocks extending nearly 200 yards outside it; the islet forms the eastern limit of the anchorage.

Anchorage.—The usual anchorage was formerly in the middle of the bay, eastward of the round tower, in about 7 fathoms, sand; but it was seldom resorted to except for temporary shelter against strong northwesterly winds. The ridge before mentioned affords some protection from the westward, but with southwesterly winds a heavy sea rolls in and renders it unsafe.

The mole or breakwater, which is about 360 yards in length, no doubt affords the necessary shelter alongside for such vessels as visit the port.

Directions.—From the westward a large vessel should pass about 200 yards northward of Sapienza and, when the end of the breakwater bears northward of 6° , steer for the anchorage in the middle of the bay.

From the eastward, vessels entering Methoni Channel should keep in mid-channel, where the depth is from 20 to 22 fathoms; the water shoals rapidly on either side within the depth of 10 fathoms; haul up for the breakwater when its extremity bears 332° , and when abreast Kuluras Islet, steer as requisite. In moderate weather the current sets westward through the channel at about 1 mile an hour.

Coast.—**Kolivri Point**, 3 miles southeastward of Methoni, is a promontory 228 feet high and has the appearance of a round islet; it is skirted by rocks at the distance of $\frac{1}{4}$ mile, one of which is above water. The shallow water round Methoni Bay continues along shore to Kolivri Point.

About $\frac{3}{4}$ mile eastward of Kolivri Point is a rock above water, close to the shore, with a sunken rock outside it; between these rocks and the point there is a $2\frac{1}{2}$ -fathom patch.

Sapienza Island (ancient *Cenusai*), 1,600 yards from the coast of the Morea, is $3\frac{1}{4}$ miles in length north and south and irregular in breadth, its extremity being about $1\frac{1}{2}$ miles across; the northern part is 740 feet high, the hills gradually declining in height to the southward, and from the northwestward the island appears triangular, sloping toward the south. At the northeastern part of the island an elevated spur projecting eastward is bordered on its northern side by shallow water to the distance of $\frac{1}{4}$ mile, narrowing the Methoni Channel for large vessels.

The western coast is sinuous with scattered rocks along its southern part; at the southern end of the island, the lighthouse is a conspicuous object; just off it are some sharp dark rocks named Thio Adelphi; elsewhere, the coast of the island is rocky and, in general, steep-to. The 100-fathom curve passes within $\frac{1}{2}$ mile of the southwestern part of the island, and so rapidly does it deepen in this direction that between 4 and 7 miles from the island the depth is from 1,300 to 2,000 fathoms.

Port Longo, on the southeastern side of the island, is fronted by an islet with a large rock just westward of it, both of which should be left on the starboard hand in entering, the passage northward of the islet being shallow. The port is only used by fishing boats and by small vessels seeking shelter against northwesterly and southwesterly gales; the anchorage is in a depth of 7 to 10 fathoms.

Light.—From an octagonal tower, 24 feet high, on the southwest summit of Sapienza Island, at an elevation of 361 feet above the sea, a light is exhibited, visible 25 miles. (See Light List.)

Santa Mariani Islet, nearly in mid-channel between Sapienza and Skhiza Islands, is about $\frac{1}{2}$ mile in length and 100 feet high, with deep water in the channels on either side, but with shallow water extending a short distance from its northeastern side.

Skhiza Island (lat. $36^{\circ} 44' N.$, long. $21^{\circ} 46' E.$), 2 miles south-eastward of Sapienza, is $3\frac{1}{2}$ miles in length $1\frac{1}{2}$ miles nearly in breadth, and has a round hill near its northern end 644 feet high; with the exception of this hill the island is generally flat, rocky, and barren. It has deep water nearly all around, but the southern point is foul to a short distance.

Port Skhiza, a small cove on the southwestern side used only by small coasting craft, has a rocky $4\frac{1}{2}$ -fathom shoal in the middle of the entrance.

Arnatzi Rock, about 800 yards from the eastern side of Skhiza Island, is black and about 30 feet high, with a sunken rock close northwest of it; the water around the rock is deep, but a 2-fathom bank extends about 200 yards off the shore of Skhiza abreast Arnatzi Rock.

Cape Gallo (ancient Acritas) is a steep, rugged pinnacle united to the main by a low neck of land and is nearly 7 miles southeastward of Kolivri Point; the intervening coast forms a bay, and off the sandy beach on the northern side there is anchorage with off-shore winds in a depth of 7 or 8 fathoms, sand.

From the northeastern corner of the bay the coast trends southward, is at first rocky, and then sand as far as Cape Gallo, backed by a ridge of moderate height.

Venetico Island (ancient Theganussa) is about 1 mile in length north and south, 570 feet high, and remarkable for its steep and broken appearance; its northern extremity is a low point of shingle, from which a shoal with from 3 to 5 fathoms water, extends north-northeast $\frac{1}{2}$ mile, when the water suddenly deepens. At the southern end of Venetico rocks lie off its western and eastern extremities.

Vessels taking the passage between Venetico and Cape Gallo should keep near the cape so as to avoid Venetico Shoal, extending northward from the island.

A current influenced by the force and direction of the winds sometimes sets through the passage at a velocity of $1\frac{1}{2}$ or 2 knots an hour.

Petra Karavo, or **Avgo**, are three rocks or islets 1 mile southward of Venetico Island; the largest is about 30 feet high, with shallow ground extending 200 yards to the southward, and 8 fathoms at 500 yards in that direction; the other two islets are much smaller and northward of the former. Midway between these islets and Venetico there is a depth of 24 to 40 fathoms.

Gulf of Kalamata (Kalamai) (ancient Messiniakos)—**General remarks—Aspect.**—The Gulf of Kalamata is the deep inlet receding to the northward 18 miles from the parallel of Cape Gallo, and included between Cape Gallo on the west and Cape Matapan on the east; these capes lie in a northwesterly and southeasterly direction and are about 36 miles apart.

The remarkable cone of Mount Lykodemos, 3,132 feet high, rises about $12\frac{1}{2}$ miles northward of Cape Gallo, and its eastern slopes with those of the chain of hills between form the western coast of the gulf. The northern shore is part of the fertile valley of Parnissus, through which the Parnatza River flows, running into the sea at the head of the gulf; where also several small rivulets discharge, but these are mostly dry in summer. The eastern coast is that of the Mani Peninsula or Maina, terminating southward in Cape Matapan and backed by a chain of lofty mountains.

The most conspicuous of the mountains on the Mani Peninsula which divides the Gulfs of Kalamata and Kolokithia are: Mount St. Elias or Makryno, ancient Taygetas, which rises 7,897 feet above the sea, on the parallel of $36^{\circ} 56' N.$, and about 7 miles from the shore of the gulf, its summit being always covered with snow except during midsummer; Mount Mavro, 6,274 feet high, $3\frac{1}{2}$ miles to the southward; Mount Kubenova (lat. $36^{\circ} 47' N.$, long. $22^{\circ} 25' E.$), $6\frac{1}{2}$ miles farther south, with an elevation of 4,827 feet; the Sanghia Mountain, 3,800 feet high, 15 miles northward of Cape Matapan; Mount Mamotika, 11 miles northward of the cape, 3,530 feet high; Mount Kakovuni, 3,000 feet high, $2\frac{1}{2}$ miles south of Mount Miniatika; and the hills between this latter mountain in gradual descent to Cape Matapan.

In clear weather, the lofty mountains may be sighted at a great distance; Mount St. Elias is, however, frequently enveloped in clouds except during the dry summer months, and should the weather be clear excepting in the direction of that mountain, the observer may feel assured that under those clouds is Mount St. Elias. With southeasterly winds, these mountains are covered with clouds and the lower parts only are visible; a practical knowledge of their outline is therefore valuable.

Wind and weather.—The winds which blow out of the gulf are at times of great force. In ordinary weather the wind blows from the gulf during the night and from seaward during the middle of the day. It is subject to sudden changes and heavy squalls, usually attended with heavy rain, thunder, and lightning, especially during autumn and winter, the wind shifting in a few minutes from southeast to northeast, blowing furiously for a few hours, and then backing round to its original quarter.

Southerly winds seldom blow home, but a tremendously heavy swell then rolls into the gulf. In strong southerly gales, vessels seek the anchorage at Petalidi on the western shore, and Armyro and Kitries on the eastern side of the gulf.

Koroni Bay.—The castle of Koroni (ancient Asine), 6 miles northeastward of Cape Gallo, stands on an elevated plateau, on a rocky tongue of land projecting 1 mile in an easterly direction and terminating in Livadia Point; the castle bears evidence of having once been a fortress of considerable strength, as its embattled walls, massive round towers, and subterranean passages, now in ruins, are visible in every direction.

The town of Koroni extends along the shore on the northwestern side of the castle and contains about 2,000 inhabitants; it has a fair trade in olives, oil, fruit, and excellent wine.

A road along the shore leads from Koroni through Petalidi to Kalamata.

Anchorage—Mole.—A small mole projects about 200 yards north-northeast from the town, affording shelter to small craft from southeasterly winds; anchorage for large vessels is from 800 to 1,600 yards offshore, in a depth of 8 to 10 fathoms, mud.

When approaching from the southward, a fair berth should be given to Livadia Point, as a strong current at times sweeps round it. The shore in front of the town is rocky, and, at the point $\frac{1}{2}$ mile northwestward of the mole, rocks extend nearly $\frac{1}{2}$ mile offshore; small vessels intending to take up an inshore berth should not anchor westward of the town. This is an excellent anchorage during a southerly or southwesterly gale.

With northeasterly or gulf winds, there is anchorage about $\frac{1}{2}$ mile from the shore in the sandy bay southwestward of the castle in 9 or 10 fathoms, sheltered from these winds, which at times blow with great force.

Petalidi Bay.—From Koroni the coast trends northward nearly 10 miles to Petalidi, and is skirted here and there by rocks; about 2 miles from Koroni there is good anchorage 1 mile from the shore in depths of 10 to 12 fathoms, muddy sand. In the vicinity, excellent fresh water runs into the sea, and there are two or three villages. The land is well cultivated with the vine, and extensive plantations of olive trees cover the slopes of Lykodemos.

The village of Petalidi, ancient Corone, at the foot of Mount Lykodemos, stands on the shore of a small shallow bay open to the northeast and formed by a low point; projecting from this point are the remains of an ancient mole, which, together with some rocks, reach nearly 400 yards from the point.

The bay is sheltered from all winds but those from the southeastward, which seldom blow home. Coasting vessels anchor in shallow

water, sheltered by the mole, and remain for the winter; larger vessels anchor northward of the point and at about $\frac{1}{2}$ mile from the shore in a depth of 6 or 7 fathoms. The bay may be known by a white church on the point.

Petalidi Light, fixed red, elevated 24 feet above the sea, is shown from an iron shed 20 feet high, and is visible 5 miles.

Water may be obtained from the Iane River about 1 mile northward of Petalidi.

Coast.—The low shore of the plain which bounds the head of the Gulf of Kalamata commences northward of Petalidi, and, bending round eastward at 2 miles northward of that place, from thence trends eastward about 10 miles to the northeastern head of the gulf; in the interior are the lofty mountains of Arcadia.

Pyrnatza River runs into the gulf about $4\frac{1}{2}$ miles northeastward of Petalidi; the bar has but 2 feet water over it and is dangerous at times; the river abounds in fish, particularly lobsters, which are of large size.

Nisi village, on the bank of the Pyrnatza, about 4 miles from its mouth, carries on a considerable trade, the produce from the interior being brought down the river in boats and shipped on board vessels at anchor off the river's mouth. The produce is corn, oil, wine, currants in large quantities, potatoes, and dried figs. The anchorage off the river is in a depth of about 8 fathoms.

Kalamata (Kalamai), near the northeastern corner of the gulf, and from which the gulf takes its name, is at the foot of a little hill on which is the ancient acropolis of Pharæ about 1 mile from the sea.

The harbor of Kalamata is formed by a breakwater extending in a southerly direction from the shore about 200 yards, when it turns southeastward for about 700 yards, terminating in 29 feet of water, inclosing depths of from 16 to 18 feet. The entrance, between the eastern end of the breakwater and a mole stretching out from the shore, is about 200 yards in width.

Kalamata Lights.—From a mast 93 yards from the outer extremity of the breakwater, and elevated 26 feet above the sea, a fixed red light is exhibited, visible about 3 miles.

A fixed green light is exhibited from the mole head, north side of entrance. (See Light List.)

Directions—Anchorage.—The harbor can probably accommodate most of the vessels trading to the place. There is temporary anchorage in a depth of about 12 fathoms, sandy bottom, outside the breakwater. The port may be known at some distance by the castle or acropolis, which appears above the trees, and on a near approach, the breakwater and the houses on the beach will be seen.

The town is surrounded by vineyards and olive plantations, with the broad bed of the Nedon, a mountain stream, passing close west-

ward of it; the main part of the town is about $1\frac{1}{2}$ miles from the beach, and is considered healthy, occasional cases of ague being the only disease in any degree common. It is rapidly increasing in size and importance as a seaport.

It had a population of 11,642 in 1897.

Communication.—Kalamata carries on a brisk trade, has a regular communication with Athens three times a week, and is in direct railroad connection with it. The customhouse is near the beach. Consular agents of different nations reside here.

Supplies.—Supplies and provisions of all kinds are abundant and cheap, but no coal can be procured, nor are there any facilities for repairs for shipping. The principal exports are figs, currants, wine, oil, silks, skins, valonia, etc.; the imports, manufactures, colonials, iron, sulphur, rice, glass, salt fish, wood, sugar, and hardware.

Armyro Bay, 2 miles east-southeastward of Kalamata, affords some shelter during southeast gales in a depth of 10 fathoms, under very high land 600 yards from the shore, and somewhat sheltered by Cape Kitries, the most salient point of the eastern coast of the gulf. Before the harbor was formed at Kalamata, vessels sought shelter in this bay when Kalamata road was not tenable. Here vessels lie in safety, almost becalmed as the wind does not blow home, though a very heavy swell sets in. Northwestern winds blow furiously off the plain within Kalamata, but the water is then smooth. The village of Armyro is of no great extent.

Kitries Bay.—Southward of Armyro Bay, and about $5\frac{1}{2}$ miles from Kalamata Harbor, is Kitries Bay, sheltered from the southward by Cape Kitries; but, being inconveniently deep, having 35 fathoms in the middle and from 18 to 20 fathoms 100 yards from the shore and exposed to northwesterly winds, it is seldom resorted to. Coasting vessels anchor close to the shore and make fast to the rocks on the southern side of the bay; the holding ground is good.

During summer the lofty mountains which rise in the vicinity of the bay and the calms usual at that season cause great heat.

Cape Kitries, immediately southward of the bay of that name, is a bold round promontory 1,148 feet high, the most western point of the eastern side of the Gulf of Kalamata, clear of danger, and steep-to; it is easily recognized and is conspicuous from the southward.

Cape Kitries Light.—On this cape stands a lighthouse 36 feet high, from which, at an elevation of 102 feet above the sea, is exhibited a fixed and flashing white light visible 10 miles. See Light List.

The coast from Cape Kitries trends southeastward 3 miles to Cape Kurtissa, and then falls back in a northeasterly direction, forming a bay about 1 mile deep, of which Chapel Islet marks the eastern

limit. The islet is close to the shore, and so named from having a chapel on its summit; it shelters an anchorage for small coasting craft.

The village of Skardamula, containing about 90 houses, may be seen on the slope of a hill, a spur of Mount St. Elias, whose white summit rises majestically to the northeast about 7 miles from the shore of the bay.

At $2\frac{1}{2}$ miles southward of Chapel Islet is Stupar Point, a small projection surrounded by a reef at the distance of more than $\frac{1}{2}$ mile; on the reef and 600 yards from the shore is a submarine spring. The rugged and barren coast continues southward for 10 miles farther to the entrance of Poor Limeni; nearly midway is the projection named Cape Trakhela. The land in general about Port Limeni is high, mountainous, and barren. With strong southwesterly winds the sea breaks heavily along this coast.

Light.—At Port Kardamilli (Skardamula), north of jetty, near Chapel Islet, a fixed red light is exhibited, elevated 45 feet above the sea, and visible 6 miles.

Port Limeni is the best natural port in the Gulf of Kalamata; its entrance, 800 yards wide, is open to the westward, from whence it extends eastward more than 1 mile, and widens by a curve in the southern shore toward the houses of Limeni.

In approaching the port the water is very deep; but within, the depths are from 10 to 4 fathoms. It is necessary to moor off Limeni on the southern side of the port.

Northeastward of the head of the port is the village of Vitylo; southward of Limeni is the town of Tsimova. The neighboring peasantry use all these names for the port.

Limeni Light, fixed red, is exhibited from a dwelling about 21 feet high, at an elevation of 42 feet above the sea, visible in clear weather from a distance of 5 miles.

The coast from Port Limeni trends southward for 9 miles to Port Mezapo; in the intermediate coast are several indentations all open to the west, of which the principal are Dyko, Spazari, and Artzi Bays.

Port Mezapo is open northwestward, 1,200 yards wide at the entrance, and 1,400 yards in extent in a southeasterly direction. The water is deep, there being from 30 to 20 fathoms. Vessels moor in the eastern angle of the port, near the houses of Mezapo.

A rather high tongue of land terminating in Tiganí Point forms the western side of the bay and shelters it from southwesterly winds and sea. The termination is remarkable, being whitish, steep, level on the summit, with the ruins of a tower on it, and, being joined to lower land on the south, it appears almost like an islet.

The village of Mani, containing about 100 houses, may be seen $1\frac{1}{2}$ miles from the bay, on a level on the slope of Mount Miniatika, which

rises 3,530 feet above the sea and is a good mark. When coming from seaward, the land of Cape Grosso is also a mark for the port, and may be approached at discretion.

Cape Grosso.—At 2 miles southwestward of Port Mezapo is Kipula Point, the northwestern extremity of a remarkable promontory, of which the sea face forms an outward curve for about 4 miles northward and southward under the name of Cape Grosso; it is an elevated plateau 1,235 feet high, almost level, and rising abruptly from the sea. The scattered houses of Orias on the tableland are marked by a terrace on the south caused by a landslip, the result of an earthquake. The coast is of a reddish color and steep-to, there being a depth of 150 fathoms at the distance of 1 mile.

Iali Bay.—From the southern extremity of Grosso Promontory to Cape Matapan, at a distance of $6\frac{1}{2}$ miles southeastward, the coast trends inward forming a broad bay, at the northern end of which is Iali Bay with an indentation running in northward about $\frac{1}{2}$ mile to Gerolimena at its head.

Gerolimena Light.—From a dwelling 21 feet high a fixed red light is exhibited at an elevation of 56 feet above the sea, visible 5 miles.

Port Marmari, at 3 miles northward of Cape Matapan, is a depression or saddle in the land, and here, on the eastern side of the Matapan Promontory, is the Port of Kaio, and on the western side the little port of Marmari, the heads of the two ports being only 600 yards apart and separated from each other by the neck of land forming the saddle. Marmari is open to the westward, 600 yards wide, and about the same in extent.

Coast craft anchor off a small inlet on the southern side of the port. The position of the port may be known by the saddle, by an old tower on a little hill on the northern side of the entrance, and by another tower farther eastward over Port Kaio, which is also conspicuous.

Karavi Islet, $4\frac{1}{2}$ miles northwestward of Cape Matapan, is about 400 yards in diameter and 47 feet high, with a sunken rock close to its northern extremity; about 200 yards southward of Karavi is Kenesta Rock, nearly awash, and with some sunken rocks extending about 400 yards from its southern extremity. These should be given a berth at night by observing the bearing of Cape Matapan Light.

Cape Matapan (ancient Tenaron)—**Aspect.**—Cape Matapan is the termination of a peninsula, 3 miles in length, joined to that of Mani on the north, by the isthmus, only 600 yards in breadth, which separates the little ports of Marmari and Kaio; this peninsula consists almost entirely of dark gray marble. For $1\frac{1}{2}$ miles from the extremity of Cape Matapan the land rises regularly from south to north to a height of 1,025 feet at Matapan Peak, and then falls sud-

denly abruptly toward the isthmus; therefore, when seen from eastward or westward at a distance of 12 miles or more, it appears as a triangular or wedge-shaped island. When the distance is so great that the high land of the cape is below the horizon Mount Miniatika, 3,530 feet high, and 11 miles northward of the cape, will probably be seen, and its southern slope must not be mistaken for the high land of the cape, which will become visible on a nearer approach.

When immediately southward of the cape, its extremity can not be recognized unless the lighthouse can be distinguished, on account of the high land behind it, but on the west are the steep cliffs of Cape Grosso forming regular terraces, and on the east Kisternes Hills, 344 feet high, rising immediately above Kisternes Point will be prominent.

Cape Matapan is steep-to and clear of danger and may be approached to a prudent distance, there being a depth of 30 fathoms near it. The current in its vicinity generally sets westward at about 1 knot an hour. When under sail, with strong northerly winds and near the coast, it is necessary to be prepared for the baffling and heavy squalls which blow from the high land. A landing may be effected in fine weather, on the eastern side of the cape immediately under the lighthouse.

Cape Matapan Light.—From a lighthouse of masonry near the extremity of the cape and at an elevation of 134 feet above the sea is exhibited an alternating fixed and flashing light, varied by red flashes, visible 16 miles. See Light List.

For coast eastward of Cape Matapan, see Mediterranean Pilot, Vol. IV.

APPENDIX.

Regulations with Regard to Vessels Approaching Italian Fortified Ports in a State of War.

1. The military commander of a fortified port in a state of war may, if the circumstances so require, order all foreign men of war as well as foreign and Italian merchant vessels anchored within the fortified zone to proceed to sea or move elsewhere, leaving the waters adjacent to the port free for a distance of 10 miles. Vessels receiving such directions are bound to move within a maximum period of 12 hours from the time the order is delivered on board their ships. The military commander will provide tugs for such vessels as are not in a state to put to sea within the limits of time specified, and will conduct them to some other place, according to the exigencies of the port. In the event of a refusal to leave the port the military commander may have recourse to such means as the necessities and urgency of the case may require.

2. Any vessel which approaches during the day any fortified port in a state of war, either for the purpose of approaching it or merely because her track leads within the 10-mile limit, is to take steps to insure her recognition, and is not to proceed toward the anchorage within the fortified port without having previously received the permission of the military commander through one of the semaphore stations included in the list given in article 10.

3. In order to obtain permission to enter, vessels must first be completely recognized, in which case they may proceed toward the space comprised within the limits specified in the list given in article 10, but must stop when within sight of the defense works and keep flying in an elevated position the national flag and the ship's name in the international code, to which is to be added the pilot flag and the international code signal P. D., "I request permission to enter." Permission may also be asked by wireless, but this does not relieve a vessel of the necessity of stopping on arriving at the limits hereinafter described and waiting for a reply.

4. The military commander will decide whether or not permission to enter is to be given to vessels which have complied with the foregoing article, and is to take into consideration that the presence of such vessel within the port is not to be allowed to subsequently interfere with or obstruct its means of defense.

5. The semaphore station which shall have received, by means of wireless or other signals, the request to enter, will give immediate notice to the military commander, notifying him of such information as the officer in charge of the station may deem useful, such as the name of the vessel, nationality, distance, bearing, etc.

If the military commander does not consider it convenient for authorization of entry to be given, he will cause the signal U. S. X. to be made: "Sorry I am unable to comply with your request."

The above reply may also be sent by wireless if the request has been made in a similar way.

If consent is given, a pilot will be sent. An official will also be sent in the case of neutral men-of-war or suspected vessels, such official being specially charged with the duties of recognizing the vessel by inspection and by boarding her. In such cases the inspecting officer is given authority to give or refuse leave to enter, according to the results of his visit. If the foregoing visit can not be made on account of the state of the sea, right of entry will be refused to neutral men-of-war or to foreign or Italian merchant vessels unless they are in obvious danger. Under the authorization of the military commander a special system of signals will be drawn up whereby the inspecting officer or the pilot may send through the semaphore station such information as may be useful or urgent. One of these signals is that the vessel has been subjected to a visit and another that the pilot has gone aboard, but the signal indicating that a vessel has received permission to enter and proceed to her anchorage, which signal varies from day to day, will be hoisted without fail in an elevated position from which it is easily visible to semaphore stations and defense vessels.

6. By night all entry into maritime ports is absolutely forbidden. Permission is only granted to Italian men-of-war and to vessels of an allied power under the following circumstances:

(a) Pursuit.

(b) Grave damage to the hull or vital parts.

(c) Stress of weather.

7. During the hours of night the movements of all boats of foreign men-of-war or of Italian or foreign merchant vessels which happen to be within a maritime port in a state of war is absolutely forbidden, and they are not to communicate with the shore without previous permission from the military commander. In cases of urgency, when a vessel is under the necessity of communicating with the shore without having the necessary permission from the military commander, the means to do so may be provided on the conventional signal of requesting permission to do so being made.

Any other form of signaling is prohibited.

The aforementioned vessels may communicate with the shore during the hours of daylight by means of their boats, but these must follow the most direct track from their vessels to such landing place as they may have been instructed to use in such cases.

8. In the event of vessels contravening the foregoing regulations, the requisite signals from the semaphore stations will be hoisted and a blank shot will be fired from one of the batteries charged with such duties. In any case where such warning may prove ineffective, five minutes after the blank charge a ball shot will be fired about half a cable ahead of the vessel's bows. If, after this latter measure, the vessel still shows reluctance to obey the regulations, she will be fired upon and all means taken to insure her obedience. In urgent cases the firing of a blank shot may be omitted.

9. For the purposes of the examination service the change of hours of night into hours of day, and vice versa, is fixed in all places at sunrise and sunset.

10. The following is a list of Italian fortified ports, within the limits of this publication, which are not to be approached without permission when in a state of war, as well as a list of the coastal limits of the areas of water comprised within them, anchorages, and the semaphore stations to which the request for permission to approach must be made.

| Locality. | Coastal limits. | Anchorage. | Semaphore stations with which vessels must communicate. |
|---------------|--|---|---|
| Brindisi..... | From Cass l' Abate to Vacito Tower. | Brindisi..... | Brindisi. |
| Venice..... | { From Port Cortellazzo to Port Fossone. | { Chioggia..... Venice..... Venetian lagoons..... | Sottomarina. Pilot Tower. San Nicolo di Lido. |

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